DOCUMENT RESUME

ED 147 180 SE 023 358

TITLE	National Environmental/Energy Workforce Assessment for Region VIII.
INSTITUTION	National Field Research Center Inc., Iowa City, Iowa.
SPONS AGENCY	Environmental Protection Agency, Washington, D. C.
PUB DATE	77
GRANT	EPA-T-900591010
NOTE	106p.; For related documents, see SE 023 292-360
EDRS PRICE	MF-$0.83 HC-$6.01 Plus Postage.
DESCRIPTORS	Air Pollution Control; *Career Opportunities; *Educational Programs; Energy; Environment; *Manpower Needs; National Surveys; Pesticides; *Pollution; Post Secondary Education; Radiation; *State Legislation; Water Pollution Control
IDENTIFIERS	Noise; Solid Wastes

ABSTRACT

This report represents a detailed summation of existing workforce levels, training programs, career potential, and staffing level projections through 1981 for EPA Region VIII. This region serves the Rocky Mountain - Prairie Region and includes the states of Colorado, Montana, Wyoming, Utah, North Dakota, and South Dakota. The specific pollution programs considered include air, noise, pesticides, potable water, radiation, solid waste, and wastewater. Additionally, a section overviewing current activities in energy as it relates to pollution control and abatement is included. The content of each section is limited to the control authority which EPA possesses. The study was undertaken to provide a strategy for supporting and implementing environmental education and career training programs based on needs and growth trends evidenced by the initial workforce assessment. A selected bibliography is included for reference. (CS)

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A National Environmental/Energy Workforce Assessment

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National Field Research Center, Inc.

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NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

REGION VIII

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

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National
Field
Research
Center, Inc.

Box 287 Iowa City, Iowa 52240 (319) 351-8789

INTRODUCTORY NOTE

The National Environmental/Energy Workforce Assessment was conducted by National Field Research Center, Inc. with main offices in Iowa City, Iowa. The following personnel have had primary responsibility for the Assessment and project report.

IOWA CITY, IOWA
Dr. Darold E. Albright, President
Paul E. Bridges, Executive Director
Dr. Richard L. Benesh, Project Director
Judith J. Gordon
Alan M. Stowell
Anita M. Stowell
Mary Kay (Edge) Wade

ATLANTA, GEORGIA
Elizabeth G. Nielsen, Regional Director
Robert Oxberger

DENVER, COLORADO
Nancy C. Dillenberg, Regional Director

SEATTLE, WASHINGTON
Steven Silva, Regional Director

WASHINGTON, D.C.
Frank E. Smith, Project Coordinator
Lloyd B. Chaisson, Assistant Project Coordinator
Jack F. Seum

Additional research and clerical assistance was provided by Frederick M. Wall, Maxine Wolfe, Margaret Fehn, Sandra Hogsed, Karen Kirchoff, Sharon Leiker, Marilyn Low, Mary McCormac, and Joan Urquhart.

FIELD OFFICES

ATLANTA
2700 Cumberland Pkwy
Suite 150
Atlanta, GA 30339
(404) 433-2644

DENVER
2600 S. Parker Rd.
Suite 160, No. 6
Denver, CO 80232
(303) 751-4982

SEATTLE
927 Unisad Pacific Bldg.
1000 2nd Ave.
Seattle, WA 98101
(206) 623-9170

WASHINGTON, D.C.
1522 K Street, N.W.
Suite 600
Washington, D.C. 20005
(202) 223-9138

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ACKNOWLEDGEMENT

This report was researched and prepared under the direction of the U.S. Environmental Protection Agency, Region VIII. The Region VIII materials were developed under the auspices of:

Mr. Elmer Chenault
U.S. Environmental Protection Agency
Regional Manpower Officer and
Technology Transfer

The assistance and support of the Office of Manpower Development and Technology Transfer proved invaluable, and sincere appreciation is extended to Mr. Chenault and to Mrs. Lucille Johnston.

Assistance in federal and state program areas has been most graciously accorded the project staff by the U.S. EPA Region VIII personnel including the following:

Mr. Ivan W. Dodson
Pesticides Branch
Air & Hazardous Materials Division

Mr. Lawrence P. Gazda
Waste Management Branch
Air & Hazardous Materials Division

Mr. Jack Hoffbuhr
Water Supply
Water Division

Mr. Max Dodson
Statewide Management Section
Water Division

Mr. Seth Hunt
Organizational & Personnel Branch
Management Division

Mr. John Tucker
Research & Application Branch
Office of Energy Activities

Mr. Charles Stevens
Air Branch
Air & Hazardous Materials Division

State and agricultural personnel from all Region VIII states are major contributors to this project. Appreciation is expressed to those individuals in the individual state reports. To all those persons who contributed generously to this project, the authors extend their gratitude.

PREFACE

This study presents an overview of existing workforce levels, training programs, career potentials and major activities within the Region VIII office of the U.S. Environmental Protection Agency (EPA). Staffing level projections (1976-1982) are also developed based upon available information. EPA program areas included in this report are: air, noise, pesticides, potable water, radiation, solid waste, and waste water. In addition, a section relating to Federal activities in the area of energy conversion/conservation has been included, providing similar information to that of the respective EPA sections.

This regional report is designed to supplement eight additional reports, one for each state within Region VIII. The information and data presented in this and the other reports were compiled largely as a result of interviews with professionals working in the respective areas. It should be pointed out that the data, where not documented by records, represents the best professional judgements of these experts.

FOREWORD

Information for this report was largely compiled from on-site interviews with professionals within the Region VIII U.S. Environmental Protection Agency (EPA). For increased reliability, interviews were supplemented with telephone conversations for clarification and revalidation of information. It must be noted that a large portion of the information contained herein represents the best professional judgements of those persons surveyed. In cases where more than one person provided input for a single program area, compilation of figures and recommendations were provided by the author.

This report provides information concerning the pollution control fields of the EPA. The pollution control areas included are air, noise, pesticides, potable water, radiation, solid waste, waste water, and energy. Within EPA, the compartmentalization of employees into these eight areas is not a completely clearcut process. Functions occasionally overlap, inter-divisional cooperations occur, and certain components serve a supporting role to the entire agency. Efforts were made in preparation of this report, however, to provide sufficient information for the reader to have an understanding of major linkages and roles, and to provide divisions of the workforce in a logical, realistic, and understandable manner.

While care was taken to provide comprehensive information regarding workforce levels, workforce projections, reasons for growth/decline, training programs and career potentials, as related by professionals, certain program functions have been abbreviated.

National Environmental Energy Workforce Assessment

Phase I

REGION VIII

Report

REGIONAL PROFILE

During the 1800's thousands of people migrated west in search of the fertile soils of the prairies, and later in search of the vast mineral and metal wealth of the mountains. They found both. Today, this vast and varied six-state area of the United States is called the Rocky Mountain - Prairie Region. The U.S. Environmental Protection Agency (EPA) includes in this area: Colorado, Montana, Wyoming, Utah, North Dakota, and South Dakota and refers to it as Region VIII. This six-state area, second largest within the EPA authority, contains 575,000 square miles or 16% of the total land area of the United States. Of this, the federal government owns 32%, 184,000 square miles.

Region VIII is the least populated of all EPA regions with a population density of 9.7 persons per square mile (the average nationally is 57.3). One-third of the almost 6,000,000 people live within the Denver and Salt Lake City areas. Most of the remaining persons live in rural communities and the eight SMSA cities (population of 50,000 or more).

The elevation of this scenic and agriculturally productive land ranges from less than 1,000 feet to more than 14,000 feet. Butte County, South Dakota, is the geographical center of the United States, while Devils Lake, North Dakota, is the geographical center of North America. The climate may be described as arid to semi-arid with usually mild temperatures with the exceptions of summer and winter extremes.

A number of the primary and secondary industries, according to the Standard Industrial Classification codes (S.I.C.), are represented within

the region. Principally food and kindred products and manufacturing of machinery and transportation equipment define the region's economic base. But tourism, national parks, fishing, hunting, skiing, and camping bring millions of vacationers to the area. Tourism is a major factor contributing to the economic picture. Future energy requirements will increase activities in mining, milling, smelting, as well as petroleum, electric and nuclear-related industries.

Organizational and Operational Structure

TOTAL CURRENT STAFFING LEVELS

The current staffing levels are reflected in the following table. The current total number of employees in Region VIII is 327. This figure represents an overall increase in staff of 38 persons from the year 1975. Only 6 of these, however, were newly established positions. The remaining 32 were due to normal attrition. For 1977, there will be four new positions available with an estimated 25 new hires to fill vacancies.

The following table details the current overall Region VIII staffing level:

TABLE I

Staffing Level Figures for

U.S. EPA Region VIII*

Position	1976
Administrative	41
Professional	155
Technical	41
Clerical**	90
TOTAL	327

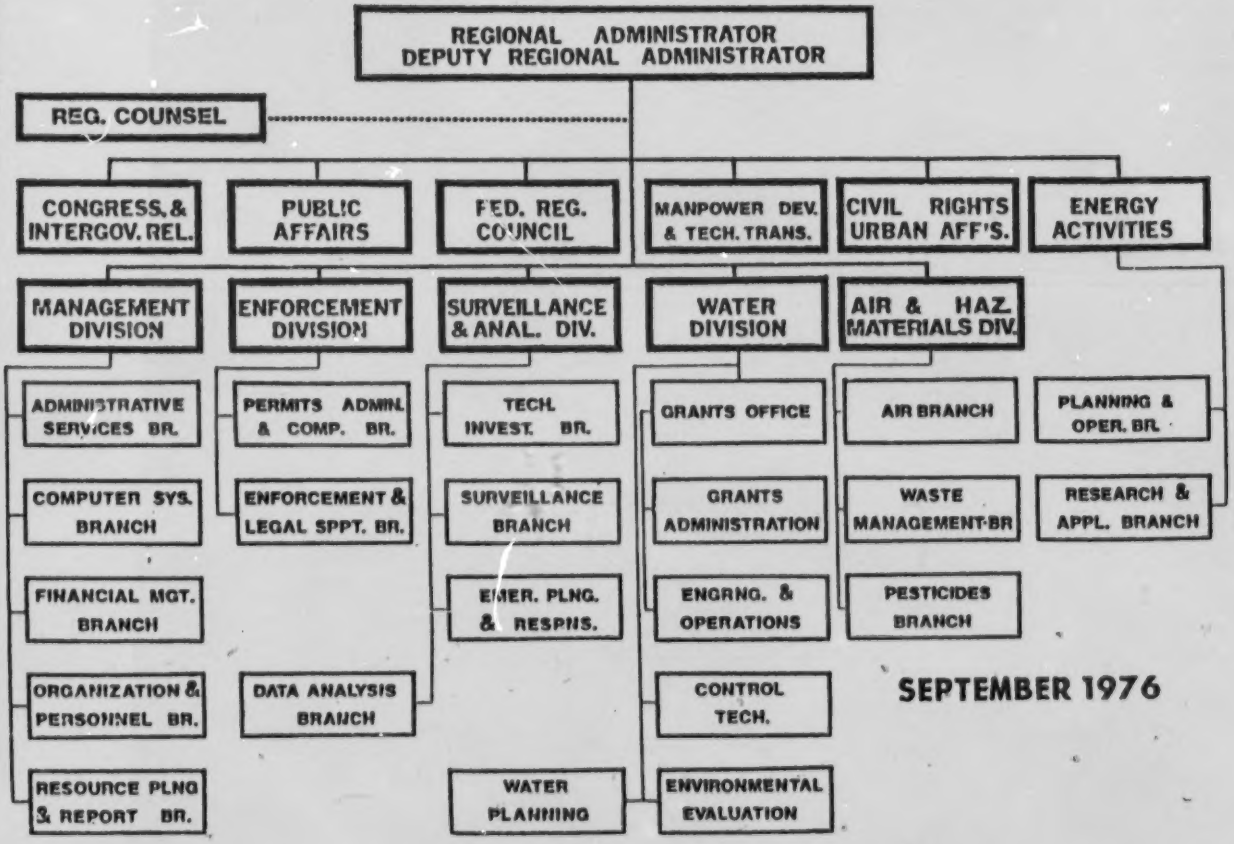
* Turnover rate: 12%
** Includes aides

Planning of land management and resources, as opposed to enforcement, is a pivotal consideration that will affect all divisions. More planning on an integrated scale may be the crucial element in preserving the delicate balance between man and his environment. A 2% to 5% per

annum workforce growth is anticipated overall for this regional office, although responsibilities will accelerate at a greater rate.

Figure 1

ORGANIZATION CHART
ENVIRONMENTAL PROTECTION AGENCY
REGION VIII, DENVER, COLO.



SEPTEMBER 1976

INTRODUCTION

Overall, the environmental pollution problems of the U.S. Environmental Protection Agency, Region VIII are neither as extensive nor as severe as the other federal regions. The emphasis here is on maintaining the high quality of life as it already exists.

Denver and Salt Lake City, however, do share some of the problems commonly associated with other large cities. These include air and water pollution, solid waste collection and disposal problems, and increasing numbers of people desiring limited quantities of water.

The mountain tourist areas are burgeoning as more and more people find an increased number of work-free hours. Leisure time activities are increasing at an unprecedented level. Aside from the more obvious problems which this increase in transient population brings forth, the wildlife of the area is experiencing increasing detrimental effects due to the growing numbers of motorcycles, trail bikes, all-terrain vehicles and snowmobiles.

The large number of farmers and ranchers in the region is working closely with the state and local representatives in an effort to curtail agriculturally related problems. Some of these problems, for example in the pesticide and predator control areas, are unique to the west.

Presently, millions of dollars are contributed to the region, as well as substantial pollution problems, through mining, milling and smelting. Enormous untapped sources of low sulfur coal, oil and natural gas pose

both problems and answers; problems for the conservationists and environmentalists and answers for the national need for increased energy resource supplies. Of major concern are the plans for strip mining of coal, as well as the anticipated extraction of the estimated 80 billion to 2 trillion barrels of oil locked within the shale of the region in Colorado, Wyoming, Montana, North and South Dakota and Utah.

The environmental problems of the Rocky Mountain - Prairie Region are less numerous than other regions. However, impending threats to the environment and to the high quality of life in Region VIII are not to be dismissed. It is the expressed hope that the cooperative and innovative western spirit continues to prevail as these challenges arise.

Regional Pollution Control and Abatement Programs

I. AIR

A. Workforce Profile

The problems associated with air quality in the states of Region VIII are neither as extensive nor as severe as those of other regions of the country. On the whole, air quality across the six-state area is considered to be good. In some parts of Region VIII the air is of exceptionally high quality. Thus, Region VIII programs tend to emphasize non-degradation to a greater extent than some other regional air programs.

Somewhat unique to Region VIII are the problems associated with altitude. Elevations range from 1,000 feet in eastern North Dakota to more than 14,000 feet in the Rocky Mountains. Problems resulting from automobile emissions are complicated by the altitude. Denver, Colorado offers the most dramatic example.

The EPA Air Programs Branch, Air and Hazardous Materials Division has the primary responsibility for air pollution control and abatement programs in Region VIII. The Air Programs Branch works in conjunction with the Enforcement and Legal Support Branch, the Enforcement Division. The responsibilities of the air programs are quite diversified and for the most part, are conducted under the authority of the 1970 Clean Air Act as amended. According to the Region VIII Organization and Functions document, the Air Programs Branch works closely with the states of this region in formulating programs for the prevention and control of air pollution by means of coordination of air quality plans with related

land use control, highway, and transportation plans. This branch evaluates and monitors the performance of governmental agencies regarding implementation and compliance with the requirements of the Clean Air Act. The Air Programs Branch cooperates with the Enforcement Division on problems requiring legal action against a source.

Among the responsibilities of the Enforcement and Legal Support Branch are the implementation of the enforcement programs of compliance with the Clean Air Act and evaluation of the enforcement performance activities of appropriate state agencies. The branch also provides program guidance as well as technical and legal support to state air pollution control agencies.

The Surveillance and Analysis Division provides assistance to the air program by conducting ambient air quality monitoring activities which are predicted on regional as well as national needs. In this capacity the division collects, analyzes, and evaluates air quality data, provides necessary analytical laboratory support services, and assures quality control of sampling, analyses, and data reporting.

The following table illustrates the number of persons engaged full-time in the air pollution control program. It should be noted that in addition to the efforts of the Air and Hazardous Materials Division, Enforcement Division, and Surveillance and Analysis Division, the Regional Administrator's Office and the Management Division provide administrative support to the air program.

TABLE II

Current (1976) Region VIII

Air Pollution Control Staffing Level

Position	1976
Engineer	9
Attorney	8
Scientist	10
Technician	2
Training Aide	3
Other	17
TOTAL	49

In total, there are 49 people allocated to air pollution control activities in the Region VIII office. Of these, 20 staff represent the Air and Hazardous Materials Division; eight represent the Enforcement Division; and 21 are assigned to the Surveillance and Analysis Division. The Engineering positions are predominately composed of environmental and sanitary engineers. The scientist positions include eight general physical scientists and one chemist. The technician positions are composed of engineering technicians. The 'other' category includes the following positions: planner, traffic management specialists, environmental protection specialist, manpower development specialist, fuel inspector, and clerical. The classification of environmental protection specialist refers to professional administrative personnel who do not necessarily hold degrees in engineering or the sciences.

B. Workforce Projections

As stated in the Region VIII FY 78-82 Preview Submission document, the primary issue under consideration in the regional air program is identified as the acquisition of sufficient resources in order to achieve EPA's basic air objective: the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). Combined with efforts to prevent significant deterioration of existing high quality air, the task of attaining and maintaining NAAQS in Region VIII will require a substantial addition of personnel for fiscal year 1978 (FY 78) and for two to four years thereafter. Most of the control situations of lesser importance have been addressed. Those remaining problem sources have been categorized as: (1) recalcitrant; (2) hard to solve; or (3) significant minors. Moreover, large-scale energy development in presently defined clean air areas will require considerable regulations review efforts. Concerning the issue of energy development, particular attention will be given to the significant deterioration regulations.

Thus, the first priority will be the implementation of the attainment/maintenance plans. Once accomplished, emphasis will be placed on new source review in order to avoid further pollution of non-attainment areas. To accomplish these goals, valid ambient air quality data must be made available. This will require network evaluation and completion of necessary changes to ensure an effective quality control program for laboratories and field monitoring stations. Additionally, each state must have a viable new source review program which the regional office must audit periodically in order to assure proper administration.

EPA enforcement action may be necessary for recalcitrant sources and significant minor sources which the states find too difficult to expedite.

The regional office will require additional resources for increased activities involving the attainment and maintenance of the NAAQS program elements. Further, prevention of significant deterioration (PSD) issues can be extremely resource intensive. Region VIII includes 26 Indian Reservations and it is anticipated that assistance with PSD will be substantial. Additional activities have been identified that will also require additional resources. They include the following:

- Control agency program grants negotiations;
- Energy program interface activities;
- Assistance to Indian tribes within the region;
- Emergency air episode response;
- Unleaded gas enforcement;
- Research grants administration;
- Public outreach;
- Energy Supply and Environmental Coordination Act (ESECA);
- Section 109 (j) National Ambient Air Quality Standards of the Clean Air Act; and,
- Intermodel Planning Group (IPG) activities.

In the Preview Submission document, it is estimated that 33 additional persons will be needed for FY 78 to conduct enforcement-related activities. It is further estimated that if the various Clean Air Act amendments are adopted, a ten percent increase in positions would be needed for the subsequent two years. If this staffing growth is

realized, approximately 50 persons will be added to the staff over the next five years, an average increase of 17% per annum. Region VIII officials point out, however, that anticipated needs often do not provide the most realistic estimates of staffing growth. In the case of the Region VIII air program, the best professional judgement of program sources indicates that although considerable staffing needs exist, almost no further growth is expected over the next five years unless unforeseen funding should emerge.

C. Training and Certification

Direct training provided by EPA has been a significant resource for satisfying public agency needs for professional staff improvement. It appears, however, that the efforts of the EPA Air Pollution Training Institute at Research Triangle Park will decline. This function would be partially assumed by universities offering certain courses under national contracts. Region VIII anticipates that it will provide certain courses which will not be available under contract.

The principal emphasis of the regional air training program is defined as the provision of professional training for state and local agency personnel. Training in automotive emissions control for vocational teachers, inspectors, and mechanics continues and will be expanded further.

There has been increased demand for short courses in various aspects of air pollution control. Because of the future uncertainty of course offerings available from the Air Pollution Training Institute, plans

are being developed, at the regional level, to offer a series of regionally oriented courses on such topics as modeling, dispersion, new source reviews, monitoring and data utilization. It is anticipated that some national support will be forthcoming for these courses, but Region VIII and local experts will be asked to assume the major responsibility for preparation and presentation of these courses.

According to the Region VIII Manpower Strategy for FY 76, specific target groups in this region for air pollution control training are as follows: automotive emissions control instructors and mechanics, field monitors, data management specialists, enforcement personnel, laboratory technicians, and public agency technical personnel.

D. Career Potential

Almost no growth is expected for the Region VIII air program staff over the next five years unless unexpected funding should become available. Consequently, career opportunities at the federal level will be minimal. In addition, no new or unique careers appear to be emerging in the field of air pollution control. In the absence of significant staffing increases, existing staff members are likely to have their responsibilities expanded. New technology may require upgrade or cross-training, and new, more stringent legislation may require staff growth beyond present expectations. Career opportunities in air pollution control will be more plentiful at the state and local levels and may be most prevalent for mechanical, chemical, sanitary, and environmental engineers, engineering technicians, and attorneys.

E. Conclusion

According to the Preview Submission document, Region VIII air program resources will be utilized to accomplish the following tasks over the next several years:

- Implement the attainment/maintenance strategies for the identified areas within the region;
- Complete evaluation of the quality and quantity of data available for making decisions and make modifications to monitoring program as necessary;
- Implement program to deal with difficult to control sources currently not in compliance with regulations;
- Evaluate the significant minor sources and provide technical and legal assistance to the states in dealing with this problem;
- Review the existing State Implementation Plans (SIP) and proposed revisions for purpose of minimizing disruption and accusations of moving target approach, to the extent possible;
- Evaluate the institutional aspects of issues such as the Inspection and Maintenance (I & M) program and other air programs and incorporate implementation efforts;
- Coordinate with other agencies that have potential to impact air quality and factor environmental considerations into their planning activities;
- Develop and implement Stage II regulations for vapor recovery;
- Work with states to complete delegation of such programs as NSPD and PSD.

It should be noted, however, that large staffing increases will be required by the Region VIII air program to effectively carry out the increasing program responsibilities. Specifically, 33 additional positions are projected to be necessary for FY 78, and, if amendments to the Clean Air Act are passed, a 10 percent per annum increase will be

required for the subsequent two years. More realistically, program officials anticipate no staffing growth over the next five years, at worst, and only minimal increases in air program staff, at best, unless unexpected funding is obtained. Consequently, it appears that without greater than anticipated budget increases, new regulations and expanding responsibilities may result in extending the program staff beyond its ability to effectively achieve air pollution control goals.

II. NOISE

A. Workforce Profile

As has been stated previously, Region VIII is composed of six sparsely populated states. Census figures from 1970 show this area to be the least populated of all EPA regions. Nearly one-third of the people live in the Denver and Salt Lake City areas, and as would be expected, the majority of the noise related problems are associated with these metropolitan areas.

Although noise pollution is identified in these cities as a result of congestion and airports, as well as other activities, the energy-impacted localities have become increasing areas of concern to EPA personnel. For the most part, the majority of Region VIII noise control responsibilities are aligned with energy resource development and the adjunct mining, milling and smelting activities.

The Region VIII noise program is authorized by Section 8 of the Noise Control Act of 1972 which authorizes EPA to provide technical assistance to state and local governments. Responsibility for noise control programs has been allocated to the Air and Hazardous Materials Division, Waste Management Branch. The Region VIII noise control has 3 program outputs: regional support, state program assistance, and public outreach. The major emphasis is placed on program outputs. This includes new community noise programs, existing community programs, monitoring, and Environmental Impact Statement (EIS) review.

The Region VIII office is presently involved in dispersing federal funds to several states for the purpose of establishing community noise control programs which will address problems resulting from future energy resource development. The noise control program is presently being conducted by three professional staff members, all of whom are physicists.

B. Workforce Projections

The EPA Office of Noise Abatement and Control (ONAC) asserts the need for an increase in staffing of three positions per region beginning in fiscal year 1978 (FY 78). Region VIII strongly supports the position of ONAC. Pursuant to the Region VIII Preview Submission for FY 78-82 document, reasons for an increase in the noise program staff are described as follows:

- The objectives of the Noise Control Act can only be achieved if effective local noise control programs are initiated.
- EPA must depend heavily on local and state noise control programs for enforcement of the EPA new product and operational noise standards. If local enforcement were not forthcoming, EPA regulatory efforts would be ineffective.
- Effective noise control technology is now available. Necessary information must be dispersed to those communities that wish to implement an effective noise control program.
- Public concern with environmental noise problems in communities in Region VIII is high, often a top priority on the community's list of environmental concerns. The Region VIII noise control program received a large number and wide variety of requests for technical assistance in FY 76.
- Communities in Region VIII have displayed a willingness and ability to address noise problems with their own resources provided that adequate technical assistance is available. Without such assistance, communities may adopt poor ordinances which result in unworkable programs.

- The Region VIII noise control program requires sufficient staffing to at least provide technical assistance to selected prototype communities in those areas of the Region that do not have successful examples of a community noise control program to draw on for assistance and experience.

- To date, the Region VIII noise control program has had a total of ten temporary personnel because of a lack of sufficient permanent noise positions. This arrangement is inefficient and unsatisfactory.

- Communities in Region VIII are exhibiting a strong concern for problems resulting from the operation of aircraft. Region VIII has not been sufficiently responsive to those needs and requires an individual with specific expertise in this area.

Although ONAC and Region VIII officials support the need for a fairly generous expansion of noise control staff, beginning with a three person per region increase in FY 78, an addition of no more than one professional per year is anticipated for the Region VIII noise program staff over the next five years unless significant changes in legislation and regulations occur at the federal, state, and local levels. Alteration of allowable community noise levels, however, could result in a greater staff growth. National quiet city and quiet neighborhood programs could further serve to expand noise control efforts. Program staff might be involved in noise surveys, assessments, enforcement activities, ordinance development, and community education efforts. Specific areas of concern could include construction noise, boundary line emissions, planning, highway and airport noise. Much of the foregoing remains speculative, however, and cannot be effected without adequate staffing increases.

C. Training and Certification

The staff may take part in EPA sponsored manager's programs and other occasional seminars relating to legislation, enforcement, and planning. New program staff would require on-the-job training which might take the form of informal one-to-one training with a practicing professional. Training courses are available, to a limited degree, through local colleges, universities, and equipment manufacturers. Such courses are in the area of instrumentation, design, physics, and acoustics. Since the field is growing so slowly, advanced training or development of unique noise-related skills is not required at this time.

The Region VIII Manpower Strategy for FY 76 report indicates that noise-related training is needed at the state level to assist in the development of planning, administration, and monitoring competence. Community noise control officers also require training. Thus, the target groups for noise control training by the Region VIII personnel include: field monitors, community noise control officers, and state administrators.

D. Career Potential

Career opportunities in the noise control field are presently limited. The immediate future may require new combinations of engineering skills with emphasis on product/structure design and acoustics, but no new or unique careers are anticipated to emerge. A workforce of individuals trained in instrumentation may be required at the local

level for enforcement activities, but these people would be likely to use these skills in conjunction with the performance of their regular jobs, for example, law enforcement. At the career level, the physics and engineering disciplines will continue to be emphasized.

E. Conclusion

The limited expansion that is projected for noise abatement and control is due, in part, to the fact that the effects of noise are not as visible to the public as are the effects of other types of pollution. However, public concern in Region VIII regarding noise appears to be increasing. There will continue to be positions in industry for design engineers and scientists with backgrounds in acoustics and physics, but these positions will be few, and noise activities will be conducted in conjunction with other duties. Airport, highway, and urban/suburban noise will become matters of increasing concern, and control actions will eventually increase in these areas. For the next several years, problems will likely be resolved at the state and local levels with minimal resource increases. As a consequence, noise control and abatement career opportunities at the federal regional level are anticipated to develop slowly. Significant and definitive legislation could affect future workforce requirements.

III. PESTICIDES

A. Workforce Profile

Region VIII consists of six states which include vast agriculturally productive areas. According to the U.S. Department of Agriculture, the average farm in the United States as of 1974 was described as 384 acres in size. In Region VIII the average farm may consist of 2,600 acres.

During the years, substantial changes have taken place within the agricultural industry of the region. The most dramatic changes took the form of mechanized farming as mechanical devices replaced manual labor, and agricultural chemicals became available. These two changes, along with increased breeding stock, higher grade plants and better educated personnel contributed to an improved economic climate in the agricultural community of the region.

Pesticides related problems in other localities of the country, therefore, may be confined for the most part to insect and rodent control in urbanized centers. In the Rocky Mountain Prairie region, however, agricultural chemicals predominate. The alleviation of financial loss from predation of livestock, the control of wild canids (coyotes, red fox, gray fox, and wild dogs) is a matter of great concern to the agricultural industry. Currently (1976), the only state allowed the use of cyanide capsules and the spring loaded ejector mechanism (known as the M-44) is located within the boundaries of Region VIII. Human and animal health maintenance is involved in programs of rodent plague control and the regulation of rabid skunk populations. These programs are somewhat unique to Region VIII.

Across the region, then, along with energy resource development, agricultural endeavors are major contributors to the overall economic profile of the area. Pesticides related activities within Region VIII, therefore, include predacides, rodenticides, fungicides, insecticides and herbicides as well as pesticides.

The Region VIII pesticides program has been allocated to the Air and Hazardous Materials Division, Pesticides Branch. As set forth in the regional Organization and Functions document, the Pesticides Branch is responsible for the collection of pesticide samples, analysis of pesticide products, investigation of pesticide accidents and possible misuse of pesticides, safety review of registered pesticides, and technical support to the Enforcement Division on enforcement actions where violations of the Federal Insecticide, Fungicide and Rodenticide Act, (FIFRA) are encountered. This branch also assists the states in the development of cooperative pesticide use control capabilities by reviewing current and proposed pesticide programs, including enabling legislation, pesticide applicator certification plans, experimental use permits, safety-in-use, accident reporting, state capabilities, contracts, cooperative agreements, grants, and pesticide use statistics.

As with most other environmental programs in Region VIII, expertise is drawn from other divisions. The Surveillance and Analysis Division and the Enforcement Division contribute to the overall Region VIII pesticides program activities.

Currently, the pesticide program has a staff of 17 professional, technical, and clerical workers. The staffing level of the program, by position, is depicted in the following table.

TABLE III

Current (1976) Region VIII

Pesticides Control Staffing Level

Position	1976
Engineer	1
Scientist	8
Technician	1
Aide	3
Other	4
TOTAL	17

The engineer is a sanitary engineer. The scientist category includes three chemists, two biologists, one general physical scientist, and two consumer safety officers. These persons have four-year advanced degrees, and/or extensive experience in the sciences. The technician is an environmental protection assistant, a position which generally requires an associate's degree or two years of higher education. The aides include a pesticide program advisor trainee, a physical science aide, and a summer aide. The 'other' category is composed of three clerical personnel and the branch supervisor.

B. Workforce Projections

The Rocky Mountain Prairie Region is the second largest geographical area under EPA authority and is largely agrarian. Agricultural chemicals are applied extensively both by commercial operators and by farmers and ranchers. In addition, the state agencies themselves are involved in large-scale pesticides application programs. The workload of Region VIII

pesticide program personnel is largely dependent upon the efficacy of the state pest programs. In Region VIII these programs range from being newly developed to moderately sophisticated. All state pesticide programs in this region are administered by the state departments of agriculture. Most of these state agencies are understaffed. With one exception, the registration of pesticides has been only a licensing function, and in the two states in which commercial operators have been fully licensed, the licensing examinations have not met current EPA standards. Moreover, legislation needs revision in several states.

Perhaps the major problem confronting the pesticides program is derived from the strong state's rights attitude. The western farmer, rancher and citizen-at-large resent federal interference in areas which these states define as largely their sole jurisdiction. Decrease in the sheep population, increase in predation and, for the most part, nullification of use of toxicants on federally owned grazing lands have not added to the popularity of the federal personnel across the western states. Additionally, it is difficult for the regional staff to develop close working relationships with the state departments of agriculture because of the infrequency of contact and the great distances involved. One-to-one relationships have been defined as most adequate, however. The Region VIII staff has cited difficulty in quickly responding to pesticides-related accidents involving drifts, spills, as well as people and animals, as predominantly due to distance restrictions.

Because of the limited enforcement staff, the Regional Office is unable to carry out adequate surveillance of pesticides usage and is

currently unable to respond to a number of complaints and incidents. Enforcement programs in the states generally are adequate. The Regional Office, however, should provide assistance in the initial phases of state enforcement program implementation. Further, since state enforcement staffs are limited, the Regional Office should provide assistance in the recruitment and training of new staff members.

The variety of problems are exacerbated by an insufficiency of staffing and money. Consequently, the Regional Office focuses only on the most pressing problems and cannot pursue aggressive abatement, control and enforcement programs.

Region VIII points out in its FY 78-82 Preview Submission document that remediation of these problems may exist in six additional personnel to be assigned to the State Assistance Section of the Pesticides Branch. These additions would be field positions to be located in the six state capitals of the Region. Further, it is recommended that eight additional persons be added to the enforcement staff in FY 78 with a total of seven additional positions added by 1982. The new positions would be utilized as follows:

- Investigations primarily of restricted use pesticides;
- Inspection of intrastate pesticide producing establishments;
- Double the state/federal cooperative enforcement grants from three to six (to develop and monitor work programs);
- Surveillance of import shipments to assure compliance with the FIFRA and train all customs officers in pesticide import regulations.

Although substantial staffing and funding needs exist for the pesticide program, as demonstrated above, Region VIII officials

anticipate little, if any, actual staffing increases. Rather, a shifting of personnel and a reallocation of duties are more probable occurrences. Accordingly, resources may be assigned to provide more technical and enforcement assistance to the states to achieve compliance with FIFRA. Thus, it is more likely that the expanding demands on the regional pesticide program staff will be met by personnel shifts and increases in the workload of existing staff members rather than through the acquisition of new personnel.

C. Training and Certification

All new entrants to pesticide programs may receive informal on-the-job training, or, on occasion, training may be more structured. The new entrant may spend an extended length of time assigned to field personnel. Regional Office training may include sessions emphasizing laws, regulations, and procedures. In addition, the branch attempts to keep employees up to date on current issues and activities regarding pesticides.

Management and clerical courses are available to anyone through the Civil Service Commission. Technical upgrade training for personnel is available to some extent through such groups as the Federal Aviation Administration, the Food and Drug Administration and the Association of Federal Investigators. Also, a federal training school for investigators exists near Washington, D.C., which could be valuable for the Pesticides Branch personnel able to travel out of the region.

Training offered by the Pesticides Branch takes several forms. The branch assists the state lead agencies and the Cooperative Extension

Service in their own training by making presentations at conferences and seminars. The same type of situation exists with other federal agencies such as the Department of Agriculture, the Food and Drug Administration, and the Federal Aviation Administration, whereby the Pesticides Branch is available through cooperative agreements to assist these agencies when necessary.

Specific target groups for training in the Region VIII states include commercial and private applicators, state inspectors, and enforcement personnel.

D. Career Potential

It appears that the major increases in staff will be at the state level, and very few career opportunities will be available at the federal level. If positions do become available at either level, they will require persons with background in agriculture and natural sciences.

Integrated Pest Management (IPM) could create a demand for persons with broad based science backgrounds. However, funding for the IPM programs at the regional level does not appear likely. Unexpected increases in funding could encourage the addition of laboratory and research and analysis personnel. For the most part, these positions would require degreed level personnel. Some technical level positions could occur in the laboratory or in the field in inspection and enforcement activities.

E. Conclusion

Although substantial growth is desired in the pesticide program over the next five years for the expansion of inspection and enforcement

activities, budgetary constraints will most likely cause responsibilities to far exceed staffing capabilities. Pesticide program personnel point out that their problems are intensified by the large geographical area of the egion and by tenuous federal-state relationships.

The demobilization of the Division of Pesticide Community Studies and the closing of the Perrine Laboratory in Florida and the training center in Chamblee, Georgia, have resulted in a loss of expertise and competency in the region. Formerly, the Division of Pesticide Community Studies provided technical and laboratory assistance, technical information, training and accident investigation capability, the Perrine Laboratory trained laboratory technicians for state and federal agencies, and the training center in Chamblee trained inspectors and state pesticide project officers. This loss of instructional and technical resources comes at an inopportune time, when it is imperative that a skeletal regional and state workforce perform at their most efficient in order to achieve compliance with FIFRA.

IV. POTABLE WATER AND WASTEWATER

A. Workforce Profile

Across the six-state area defined as the Rocky Mountain Prairie Region, the two most outstanding problems related to water are quantity and quality. The scarcity of water supplies in many areas of the region have been intensified by the recent drought during the summer of 1976 and the warm, dry winter that followed. The climate, normally arid to semi-arid, during the past years has been unusually dry. The high country snow runoff which normally contributes substantially to water supplies has decreased. Reservoirs of the western states hold dangerously low levels of water. The major hindrance to the western life style is availability of water.

Energy resource extraction and processing, along with extensive agricultural activities contribute to the water quality problems of the region. Water quality management plans have been defined as the region's most outstanding accomplishments, however, during the past year. Under the Federal Water Pollution Control Act (FWPCA) P.L. 92-500, Section 208, areawide water quality planning efforts have resulted in 22 agencies across the region preparing plans which will guide local water quality management in the future.

Under the Safe Drinking Water Act (SDWA) P.L. 93-523, all of the Region VIII states have indicated intentions of assuming primary enforcement responsibilities, or "primacy". Many of the states of Region VIII,

however, have legislatures which meet biannually. Several of the states are in need of new or revised legislation in order to assume primacy. At present, it would appear that four of the Region VIII states will assume the primary enforcement responsibilities under the Act.

In Region VIII the Water Division is responsible for management and evaluation of regional water programs. Because the organizational structure of the Region VIII Water Division precludes meaningful division of personnel and programs into separate potable water and wastewater categories, both of these programs are being presented in aggregate in this section.

The responsibilities of the Water Division, as set forth in the Region VIII Organization and Functions document, include recommending goals, priorities, and objectives for the regional water programs and developing, coordinating, implementing, and evaluating these programs. The division reviews state program plans and related state performance evaluations and assists the states in developing comprehensive programs which include development of water quality standards and implementation plans for achieving those standards. An additional facet of the Water Division's responsibilities is the administration and monitoring of the municipal wastewater system grants program. Further, the division coordinates the planning of land use, interagency water and related land resources, areawide, and other water quality activities. Finally, the Water Division develops control strategies for non-point source dischargers and operates the water supply program.

The Water Division has three branches: Water Planning, Environmental Evaluation, and Control Technology. The Water Planning Branch provides overall direction to the regional water planning, land planning, and water quality standards program. It represents the region on inter-agency planning committees, provides policy guidance and technical assistance regarding EPA planning to federal, state, regional, and local officials, and administers the Water Quality Standards Program and Water Planning Grants Program.

The Environmental Evaluation Branch implements and coordinates Regional activities under the National Environmental Policy Act (NEPA) by assisting private firms and government agencies in evaluating the environmental significance of proposed projects. This branch identifies federal actions requiring Environmental Impact Statements (EIS), reviews federal EIS's and negotiates project modifications when necessary.

The Control Technology Branch integrates the water activities in the area of industrial permit reviews, municipal permit origination, federal permit activities, effluent limitation activities, and water quality standards in accordance with the Federal Water Pollution Control Amendments of 1972. The Control Technology Branch also is responsible for implementation of the Safe Drinking Water Act in Region VIII.

The Office of Grants is now part of the Water Division and has as part of its responsibilities the administration of the municipal wastewater treatment works construction grant program. A further function of this office is to provide assistance with administrative and financial matters for Water Pollution Control Comprehensive Basin Planning

Grants, Water Pollution Control State and Interstate Program Grants, Area Waste Treatment Planning Grants, Water Pollution Control-State and Local Manpower Development Training Grants and Special Demonstration Grants. All of these grants are authorized by the Federal Water Pollution Control Act Amendments of 1972.

The Surveillance and Analysis Division works in conjunction with the Water Division to provide technical and analytical assistance to state, local, and federal agencies in developing and implementing water programs. The Enforcement Division also provides support to the regional water programs.

The staff of the Region VIII Water Division including those persons in the Office of Grants who work in water programs totals 66 persons. In the Surveillance and Analysis Division, Technical Investigations Branch 25 persons are engaged in water program functions. Thus, a total of 91 professional, technical, and clerical staff members devote full time to Region VIII water programs. The table below illustrates the current staffing level, by position, of the water and wastewater programs.

TABLE IV

Current (1976) Region VIII Potable Water and Wastewater Staffing Level

Position	1976
Engineer	33
Chemist	7
Biologist	6
Physical Scientist	5
Technician	5
Aide	4
Other	31
TOTAL	91

The engineer positions are filled by environmental, sanitary and civil engineers. The chemists, biologists, and physical scientists all hold a minimum of a bachelor's degree. The biologist category includes aquatic biologists, a microbiologist, and a fishery biologist. The technician category is composed of the following positions: environmental protection assistant, physical science technician, biology laboratory technician. The aide category includes an engineering aide, a physical science aide, and student summer aides. Finally, the 'other' category is composed of environmental protection specialists, environmental analysts, an economist, an environmental planner, and 19 clerical positions.

B. Workforce Projections

According to Region VIII officials and the FY 78-82 Preview Submission document, staffing increases will be required in both the water quality and the water supply programs to effectively satisfy legislative mandates. In the past year, the water quality program met increasing resource demands by shifting personnel from lower priority activities to activities addressing more urgent regional needs. Thus, in FY 76 two person-years of effort were shifted from the ongoing non-point source technical assistance program to the management of the statewide "208" program. However, this shift of personnel endangers the effectiveness of the non-point source program by interrupting its momentum. Consequently, for FY 78 there is a need in Region VIII for a position designated to provide technical assistance to the following: 22 areawide 208 agencies, six statewide 208 agencies, 10 Indian tribes,

and eight federal agencies involved in non-point source water quality management.

Areas in which 208 agencies specifically require technical assistance are in agricultural sources of non-point pollution, which have been identified as requiring highest priority attention and implementation of irrigation flow regulations. The Region VIII Office at the present time does not have the resources or the expertise to provide adequate technical assistance in the latter area.

A second position is needed for representing EPA in activities concerning Colorado River Basin Salinity issues including implementation of the Water Quality Standards and Implementation Plan, the deliberations of the Colorado River Salinity Forum and associated work group, and the coordination of EPA programs and policies between the three affected regions, headquarters, and research labs. A third position is being requested for assignment to the Yellowstone Level B Study. A fourth position needed by the Water Quality Program is that of information specialist. This individual would provide comprehensive information and technology transfer to federal, state, and local agencies involved in 208 planning.

With regard to the Water Supply Program, additional workforce resources are required for implementation of the Safe Drinking Water Act and the Underground Injection Control Program. Region VIII will have to assume primary enforcement responsibility for the estimated 120 to 150 public water systems located on 22 Indian Reservations. This will be a particularly resource intensive task since no previous

bacteriological, chemical, or radiological monitoring has been conducted on these systems. While it is anticipated that appropriate state agencies will supervise the public water systems located on the numerous federal lands in the Region, EPA will have to provide a considerable amount of coordination to initiate the program.

During FY 77 the Regional Office will identify legislative needs within Region VIII states for assumption of primacy for Underground Injection Control (UIC) programs. Implementation of such programs will probably begin in FY 78 once appropriate regulations have been issued.

Region VIII officials expect that four of the six states in the region will assume primacy for the Safe Drinking Water Act. The states not anticipated to assume primacy are South Dakota and Utah. Region VIII officials further expect that either three or four states eventually will assume primacy for the Underground Injection Control Program. Based on these assumptions, it is estimated that 10 additional positions will be needed for the Public Water Supply Program and 9 additional positions will be needed for the Underground Injection Control Program for FY 78.

Program officials acknowledge, however, that future staffing levels for potable water as well as for the wastewater program are heavily dependent upon the mood of Congress. The expressed feeling within the region is that, in terms of water, major federal funding and activity have peaked and will now level off. Thus, moderate growth, approximately 4% per year, is anticipated for the water programs for the next five years. This growth rate will be substantially less than in the past and may be well below program needs.

Five-year workforce projections, which are estimates based upon the professional judgements of persons in the Region VIII water programs, are depicted in the following table.

TABLE V

Workforce Projections to 1982 (est.)

Potable Water and Wastewater

Position	1976	1977	1978	1979	1980	1981	%/annum growth (average)
Engineer	33	34	35	36	37	38	3%
Scientist	18	19	20	21	22	23	5%
Technician	5	6	6	7	8	9	13%
Other	35	37	38	39	40	42	4%
TOTAL	91	96	99	103	107	112	4%

Increases will be mostly for the Water Supply Program in the areas of Underground Injection Control, technical assistance to states in the water supply supervision program, and water supply related responsibilities on Indian Reservations and federal lands. Some staffing increases may be allocated to the Water Quality Program for 208 planning, but since this program received a larger share of increases in the past, growth here is likely to be less than growth in the Water Supply Program.

C. Training and Certification

Courses sponsored by the Civil Service Commission are available to nearly every EPA employee. Offerings include management and clerical type courses, including such areas as listening and memory development, bookkeeping and accounting, secretarial techniques, and office management.

Technical water related training is utilized by employees through the EPA Laboratory at Cincinnati, Ohio. Selected professional employees may also be sponsored to attend graduate level courses offered by universities.

There is no in-house formal training in the water/wastewater area, and most people who are hired must allocate a significant amount of time to becoming job ready through informal on-the-job training. Specific groups targeted for training within the states of Region VIII are wastewater and water treatment plant operators, field monitors, laboratory technicians, emergency response personnel, public agency technicians, and enforcement personnel.

D. Career Potential

Implementation of the Underground Injection Control Program will call for an increased number of scientists and engineers. Since this program is of recent origin and is undeveloped nationally, persons with knowledge in this field are scarce, and those with this type of knowledge will be in demand at both the state and federal level. Planners who have an understanding of engineering feasibility and laboratory activities may be required for 208 planning. Overall, career potential in the water/wastewater field on the federal level will be limited. At the state level, however, career opportunities may become available as the states prepare to assume primacy under the Safe Drinking Water Act and the Underground Injection Control Program. Examples of career opportunities at the state level are chemist, sanitary engineer, chemical engineer, and technician.

E. Conclusion

Growth is expected to proceed more rapidly in the Water Supply Program than in the Water Quality Program in EPA Region VIII. In neither program, however, will growth be dramatic. Rather, the aggregate growth rate is projected to be four percent per annum over the next five years. Four of the six states in Region VIII are expected to assume primacy for the Safe Drinking Water Act. Additionally, three or four of the states may assume primacy for the Underground Injection Control Program. Thus, the Regional Office will be required to make a considerable resource expenditure to conduct the programs in the states which do not assume primacy.

The insufficiency of training at the federal, state, and local level may be regarded as a problem as new regulations are promulgated which require new procedures, new and more sophisticated analyses, and previously unrequired areas of expertise. A training plan developed by EPA Office of Water Supply in Washington, D.C., is designed to meet the needs of state, local and to some extent, federal officials in meeting the mandates of legislation in regard to both water supply and underground injection.

As with the air program, responsibility in the water programs is projected to increase at a rate faster than staffing growth. Consequently, it is highly probably that workforce growth will not be adequate to keep pace with expanding program responsibilities.

V. RADIATION

A. Workforce Profile

Radiation problems are perhaps more extensive in Region VIII than in some of the other EPA regions. The majority of the country's uranium supply is located beneath these states. With increasing interest in nuclear power, uranium mining and milling in the region has increased.

Problems still remain in Colorado from the mining activities of the 1950's. Radioactive sand tailings left after the milling of uranium bearing ores have been identified as health hazards. These hazards due to tailings are present in Colorado and South Dakota. The EPA works in conjunction with the Nuclear Regulatory Commission (NRC) and the Energy Research and Development Administration (ERDA) in an effort to solve not only current problems but those that remain from the 1950's.

Colorado, Montana and North Dakota are "agreement" states. The term refers to an agreement executed between the state and the Nuclear Regulatory Commission (NRC) whereby the state assumes some of the responsibilities of the Commission.

The Region VIII radiation office is a component of the Air and Hazardous Materials Division, Waste Management Branch. The regional radiation program is responsible for supporting and coordinating state programs for radiation control and providing managerial and technical assistance to state radiation control programs. Additionally, the program includes state program assessment, planning, demonstration of new

methods, monitoring, and coordination of emergency episodes. Regional staff members conduct EIS review, provide assistance to states, carry out site visits, environmental surveys and special studies for the nuclear and radiological operations in the region. Moreover, the regional staff is directed to provide assistance to states in their State Radiological Response Plans, coordination and implementation of radiological aspects of FWPCA, NPDES, and the Safe Drinking Water Act, non-ionizing electromagnetic radiation, and regional training activities. Finally, it is necessary for the staff to maintain a continuing awareness of natural radioactivity sources such as radium in groundwater and radium, thorium, and uranium in the mining activities in the Region. The present radiation program is staffed by one full-time professional, a sanitary engineer, with secretarial support provided.

B. Workforce Projections

Although the radiation program staff is presently quite skeletal in nature, a large amount of future growth is not anticipated. It would appear that, at most, one professional person per year may be added to the staff for the next five years. As the energy shortage continues, it is anticipated that nuclear-related activities will increase. Additional staff will be required for monitoring and EIS review in this regard as well as for oversight of expanded mining and milling operations. Expanded capability also is necessary for the increased emphasis in the area of natural radioactivity and for assistance in developing State Emergency Response Plans. With the

implementation of the Safe Drinking Water Radiation Standards, Region VIII will be called upon for increased technical assistance. Limited activity in radiation control has taken place within the Enforcement Division, and little increase is expected here since much of this type of activity is handled by the Nuclear Regulatory Commission (NRC).

Additional professional positions to the Region VIII radiation control program staff may include health physicists, environmental scientists, radiochemists, and nuclear and environmental engineers.

C. Training and Certification

Upgrade training for personnel has been limited to Civil Service Commission management courses because of a lack of resources. Needs for available technical upgrade training and resources required will become more acute as new persons are added to the staff. Colleges and universities are beginning to fill in the void for radiation training, but neither EPA nor the states have sufficient resources to be able to take full advantage of the courses offered. The NRC offers courses but for the most part, these are conducted at Oak Ridge University in Tennessee.

Target groups for radiation control training in Region VIII states are radiological monitors, emergency response specialists, and state agency personnel. Training is particularly needed in the fields of sampling, analysis, instrument calibration and maintenance, and data reduction. Region VIII officials are hoping that funds will be forthcoming so that appropriate courses and workshops can be provided.

D. Career Potential

Job opportunities in the Regional Office are limited. It is expected that about five openings will develop over the next five years. Some of these jobs will be for highly trained individuals with engineering and science backgrounds (physics, radiation) and some may be for technicians with radiological training. Primary responsibility for control and abatement of radiation pollution will become increasingly a state and local function. Accordingly, it will be at these levels that positions emerge as the use and disposal of radioactive materials increase. Considerable training in the sciences and instrumentation will be necessary, although a four-year or advanced degree will not be a requirement for many jobs. Further, job openings for individuals in health and allied professions, with emphasis in radiation areas, will become a growing career option. The determinant of career potential in radiation fields will be the amount of emphasis placed on using radioactive materials in the future.

E. Conclusion

The regional radiation control effort is currently limited, and this effort is not expected to increase substantially over the next five years. The primary function of the program is regulatory, with technical assistance provided on an as needed basis. Resource limitations have served to constrain regional radiation control activities. In the future, increased emphasis will be placed on EIS review, environmental monitoring, and State Radiological Emergency Response Plans as

the use of radioactive materials proliferates. While staff growth in the Region VIII radiation office will be small, private sector career opportunities may show a rapid expansion.

VI. SOLID WASTE

A. Workforce Profile

Across the six-state area of Region VIII, the solid waste management programs are well organized but vastly understaffed. Innovative programs involving the disposal of junked vehicles are ongoing in several of the states, and resource recovery is presently in the talking stage. At this time, the lack of program resources, including manpower and funds, precludes serious planning efforts directed to resource conservation and recovery.

To compound the situation, the Region VIII EPA solid waste management program responsibilities have increased more than 200% over the last few years. In conjunction with increased responsibilities the program has suffered severe staff decreases. The recurring fact seen across the states as well as in the Regional Office is the skeletal staffing levels with which these solid waste management programs are conducted.

Responsibility for solid waste management has been allocated to the Air and Hazardous Materials Division, Waste Management Branch. The Air and Hazardous Materials Division recommends goals, priorities and objectives for solid waste management including toxic substances, and is responsible for the development, coordination, implementation, and evaluation of these programs. The Waste Management Branch interprets national strategies for solid and hazardous wastes, provides technical

assistance to government agencies, and promotes the development of appropriate state regulations and legislation.

The Solid Waste Disposal Act as amended provides the authority to accomplish the regional solid waste program. According to the FY 77 Regional Operating Guidance document, the regional role for solid waste management for fiscal year 1977 is to develop state programs capable of implementing state control over all land disposal sites where any type of waste, with the exception of radioactive, is disposed of, initiating hazardous waste control programs, stimulating resource and energy recovery and source reduction and utilizing land use planning procedures in the siting of solid waste management facilities.

The Resource Conservation and Recovery Act (RCRA) of 1976 will significantly expand the scope of solid waste management activities. This act provides the mechanism for establishing strong federal regulatory programs for residuals management by including the following factors:

- Redefining solid waste to include waste sludges, liquids, and contained gases from industrial, commercial, mining, and agricultural operations;
- Requiring control over the storage, treatment, and land disposal of hazardous wastes; and,
- Requiring the gradual phase out of open dumps and the institution of environmentally sound land disposal and/or resource recovery systems for solid waste.

Under the RCRA, the states are viewed as the principal agent for control of health and environmental problems resulting from improper solid waste management practices. The states are also viewed as the

driving force for encouraging increased conservation and resource recovery. EPA's objectives, then, are to provide technical and financial support to maximize state assumption of responsibilities under the Act.

A new toxic substances program will be implemented in Region VIII as a result of the Toxic Substances Control Act of 1976. EPA plans have not yet been finalized regarding where the unit will be placed, but the possibility exists that it will be placed within the Waste Management Branch. The initial tasks of the Regional Office in terms of toxic substances will be to provide support in the development of rules and review of proposed regulations as well as to assess the production, use, transportation, storage and disposal of toxic chemicals originating in the region.

The current (1976) staffing level of the solid waste management program is three persons: one sanitary engineer, one environmental protection specialist, and one environmental protection assistant.

B. Workforce Projections

As a result of the RCRA, technical assistance will be expanded to the state and local level and additional assistance will be required for federal facilities to meet the guidelines of the Act. Lists of hazardous waste disposal sites must be developed and types of wastes and methods of disposal must be identified. Resource recovery and land disposal sites also must be inventoried.

Federal facilities will become demonstration areas for reducing the amount of waste generated and for implementing resource recovery.

Effective methods are to be applied on a broad scale. This will require extensive assistance from the Regional Office. The Regional Office also will provide similar assistance to industries located in Region VIII.

A hazardous waste permitting program will be implemented under Title III, and states will have the opportunity to administer their own programs after having demonstrated the capability to do so. Technical assistance, again, will be required. If the states fail to accept primary enforcement responsibilities, EPA will be responsible for the entire state program implementation.

Likewise, under Title IV of the Act, states may develop Discarded Materials Plans. The Plans will prohibit establishment of open dumps, will close or upgrade existing open dumps, and will provide for resource conservation or recovery and for the disposal of discarded materials in an environmentally sound manner. Technical assistance will be provided to the states, or, if they do not assume primacy, the EPA Regional Office will become responsible.

The following table depicts workforce projections for the Region VIII solid waste management program to 1982. Projections represent the best professional estimates of program officials. Staffing at this level would allow existing personnel to concentrate on the highest priority activities for solid waste management, those of state solid waste grant support and hazardous waste management control. Additional resources would allow proper implementation of the solid waste guidelines, resource recovery program, regional and county-wide systems, and upgrading of existing solid waste systems.

TABLE VI

Workforce Projections to 1982 (est.)

Solid Waste Pollution Control

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	1	1	2	2	2	2	7%	20%
Scientist	0	0	1	2	3	3	7%	50%
Other	2	2	2	2	2	2	N/A	0%
TOTAL	3	3	5	6	7	7	N/A	20%

In terms of toxic substances, the Regional Office projects that it will require 12 persons for the program by 1982. Eight staff members will be needed for the abatement and control program and four persons will be needed for enforcement. The effort of the enforcement staff would be directed toward enforcement actions with respect to newly established standards and regulations. The Regional Office is requesting six of these positions for FY 78, three additional positions for FY 79, and the remaining three for FY 80.

C. Training and Certification

Training of solid waste management personnel has been severely curtailed at the federal level, and therefore, minimal training is ongoing in Region VIII. The training that is offered in the Region is conducted by the states, often with state funds. The state training efforts, however, are extremely limited. Regional training efforts in solid waste take the form of assistance to the states in developing

their capacity for preparing and implementing appropriate training programs, particularly those directed toward landfill operators and collection personnel. Training is also needed in the states of Region VIII for hazardous materials specialists and enforcement personnel.

D. Career Potential

No new or unique careers are expected to emerge within the solid waste management field within the next five years, and engineers and specialists will continue to be dominant. Mechanical engineers will probably be needed for resource recovery activities and chemical engineers will be utilized for hazardous wastes. Specialists enter the job market with science backgrounds. But future recruitment is likely to emphasize field experience. Specialists with experience in the fields of hazardous waste management, resource recovery, municipal waste management, and industrial wastes will be particularly strong candidates for jobs in this field. For a new entrant, an economic and legal background would be extremely helpful.

E. Conclusion

Staffing increases will be required in Region VIII to administer the mandates of the Resource Conservation and Recovery Act of 1976 as well as the Toxic Substances Control Act of 1976. However, actual staffing increases may be less than sufficient to conduct adequately the expanded workload that is certain to accompany the implementation of this legislation. It should be noted that specific projections are difficult to make at this time since passage of these Acts is very recent.

Technical assistance to the states will increase over the next several years. Inadequate training programs for federal and state personnel could pose problems. Intensifying this problem is the fact that the state solid waste management programs in Region VIII are vastly understaffed, and that in the Region VIII EPA office technical expertise is being consumed by other environmental program areas to the detriment of solid waste management functions.

VII. ENERGY

A. Workforce Profile

Region VIII is an area of vast energy resources. One half of the nation's coal reserves, 40% of the economically recoverable uranium reserves, and all commercially feasible oil shale resources are located within Region VIII. The development of alternative energy sources also could have significant environmental impacts. These include oil and gas, "tight" gas, geothermal, tar sands, solar, and hydroelectricity. Because of national policies and programs designed to achieve energy independence from international energy supplies and declining domestic oil and gas production, pressures to develop these resources are intensifying, and both the federal government and the private sector are becoming increasingly involved in energy resource development in the Region VIII states.

Thus, energy resource development within Region VIII is of potentially enormous magnitude. Currently, the only EPA Regional Energy Office is located in Region VIII. The Office of Energy Activities was established in 1974 as a staff office to the Regional Administrator. In fiscal year 1974, Region VIII encouraged the creation of the Northern Great Plains Resources Program to establish an environmental data base as well as the management and control processes necessary for the orderly and environmentally sound development of the Region's energy resources. The Office of Energy Activities was created to

expand this effort and to address regionwide energy resource developmental activities. In fiscal year 1975, attention was focused on the environmental impacts resulting from the increased coal and oil activities. At this same time, the Northern Great Plains Resources Program effort was integrated into the Comprehensive Regional Energy Program which received overtarget support in the form of 14 positions and about $2.5 million. In fiscal year 1976, the program was expanded to include uranium, geothermal, and solar energy development.

According to the Region VIII organizational and functions document, the Office of Energy Activities serves as the principal advisor to the Regional Administrator. This document also defines the Office of Energy Activities focal point for all energy related activities within the Region, both external and internal to EPA. This Office provides operational management of regional programs involving energy related activities and acts as liaison in energy matters to EPA Headquarters. Additionally, this office provides regional representation on energy/environmental committees, coordinates energy related technical investigations, and conducts regional research activities. The Office of Energy Activities is composed of two branches: Planning and Operations Branch, and Research and Applications Branch.

The Region VIII energy effort attempts to illustrate a balanced program by incorporating the following elements:

- Environmental monitoring;
- Technical investigation;
- Evaluation of control technologies;

° Impact predictions; and

° Environmental planning to minimize environmental degradation.

The Office also encourages the development of institutional arrangements for the environmental management of energy related activities.

The Office of Energy Activities is presently composed of 20 professional, technical, and clerical personnel. The following table illustrates the current workforce, by position, of this office:

TABLE VII

Current (1976) Region VIII

Office of Energy Activities Staffing Level

Position	1976
Engineer	4
Scientist	5
Aide	1
Other	10
TOTAL	20

The engineers are described as environmental engineers and the scientists are general physical scientists. The aide category consists of a summer aide. The 'other' category includes environmental protection specialists, an industrial economist, and six clerical personnel.

B. Workforce Projections

As a new and expanding field, energy is an extremely difficult area to project estimated workforce profiles. The Office of Energy Activities plans to pattern its FY 78-82 activities after the experiences of FY 74-77. In order to continue its activities, however, it is essential that program support be reliable. To date, the energy program

has been closely identified with the Office of Research and Development (ORD) program and has been funded through overtarget requests. The objectives of the ORD program differ from those of the Region VIII Energy Office. Specifically, while the ORD program is basically technically oriented, the Regional program has a dual technical and institutional thrust. The institutional aspect emphasizes relations with state and local governments through the planning and management processes. Because of the programmatic relationships that exist between the region and the state and local governmental entities, the institutional emphasis must necessarily remain an integral part of the regional program.

Most of the Air Quality Maintenance Plans, Section 208 and other environmental plans for energy impacted areas are scheduled for completion in FY 78, and environmental planning emphasis is expected to change in order to plan for implementation in FY 78 and 79. The success of the regional energy program is dependent upon the completion of monitoring and technical investigations that are planned or ongoing in time for the results of these activities to be included in the planning and regulatory processes for these other regional programs.

According to the Region VIII FY 78-82 Preview Submission document, the "hard" needs projection for 1982 is 22 persons, that is, two persons above the current staffing level. These two persons will be required to expand activities under the coal leasing program. The optimum needs projection for the Office of Energy Affairs for the next five years is 30 persons. Staff increases over and above 22 persons would be used for energy related Section 208 planning and

increased support to EPA-Indian cooperation. This cooperative effort includes activities designed to assist the development of environmental planning and regulatory capabilities within the Indian Nations. However, because of budgetary limitations, desired staffing increases may not be realized.

C. Training and Certification

EPA sponsored training and certification programs are not available in the energy area. However, pursuant to their individual requirements and identified responsibilities, the states within Region VIII all have activities ongoing in the area of education. For the most part, the states have established energy offices within the last several years. Of necessity, budgets do not always include extensive monies designated for staff training. One characteristic that all state energy agencies share is the expressed concern for education of the public regarding methods of energy conservation. To this end, almost all of the states in the region conduct public awareness and informational seminars and workshops. Several of the states are also conducting assessments within their own governmental structure to identify practices which result in energy waste.

Training for individual staff members is available through the colleges and universities of the various states. Specifically, upgrade and post graduate courses are available in the sciences and engineering areas. At present, there is no certification relative to this program area.

D. Career Potential

Professionals in Region VIII indicate that all new personnel for the energy program will be required to have at least a four-year degree in a professional field, with post graduate training viewed as highly desirable. While career opportunities in the Regional office may be limited because of budgetary constraints, the enormous amount of energy development in the states of Region VIII are certain to yield extensive workforce opportunities. It is anticipated that most positions will be for degreed engineers and scientists with specialized areas of expertise. For the most part, career opportunities will be available at the state level and within the private sector.

E. Conclusion

Because of increasing energy development in Region VIII, the EPA regional energy program may increase in priority standing. Contributing to this increase will be public demands for the development of more energy resources combined with the continuing desire of this region to mitigate environmental degradation. As a consequence, staffing needs for the Office of Energy Activities will be expanding. Resource requirements, however, may well exceed available funding. Areas of emphasis over the next five years include increased participation in the Federal Coal Leasing Program, expanded activities in energy related 208 planning, and increased support to the Indians in the development of their energy environmental planning and regulatory capabilities. The final fate of the Region VIII Office of Energy Affairs remains unknown, however.

To date, this is the only EPA effort of this nature. With the increase in other federal energy related agencies across the Region, the future of this Office is perhaps less than secure.

SUMMARY

Within the Region VIII EPA office, as within all EPA offices, future growth is, of course, dependent upon the vicissitudes of federal funding. It is clear from the foregoing that growth is required in all program areas to keep pace with increasing program responsibilities. The feeling among Region VIII officials, however, is that actual staffing growth over the next five years will be seriously inadequate. To deal with this situation, it is anticipated that the responsibilities of existing personnel will be shifted into higher priority areas and that there will be a continual expansion and redefinition of individual workload responsibilities.

The intensive efforts now proceeding for the development of the vast natural resources within the Region will affect significantly the activities of all of the divisions and will require substantial resource increases. Planning of land management and resources, as opposed to enforcement, will be emphasized. In fact, more integrated planning may well be the crucial element in preserving the delicate balance between people and the environment over the next several years.

The Region VIII Air Branch is regarded as having reached its peak staffing level, and additional staffing growth will not occur unless unforeseen funding should emerge. However, 33 additional positions are projected to be necessary for FY 78, and if amendments to the Clean Air Act are passed, a 10% per annum increase will be required for the subsequent two years. Thus, without greater than anticipated budget growth,

new regulations and program responsibilities could result in extending the air program staff beyond their ability to effectively achieve Regional air pollution control goals.

Public concern regarding noise appears to be growing in Region VIII, and programs to address this relatively new area are expected to develop slowly but steadily over the next five years. Three persons currently compose the regional noise program, and an increment of one person per year is anticipated for this program until 1982.

The viability of the pesticide program is particularly crucial in Region VIII where large farms and ranches are the norm and pesticide use is generous. The success of the regional program is highly dependent upon the efficacy of state pesticide programs, which in Region VIII, tend to be understaffed. Moreover, it is difficult for the Regional Office to develop close working relationships with the state departments of agriculture because of infrequent contact necessitated by extensive geographical distances to be traveled. Minimal, if any, staffing increases are expected in this program, and the various problems will have to be addressed with an insufficiency of resources.

The extensive technical assistance to designated planning agencies, Indian tribes, and federal agencies in the area of "208" planning and the effort required for the implementation of the Safe Drinking Water Act and the Underground Injection Control Program will be extremely resource intensive for the Regional Office. While growth in the past, especially with regard to wastewater programs, proceeded at a relatively rapid and sufficient rate, the feeling within the region is

that major federal funding and activity in water programs has peaked and is beginning to decline.

The radiation control program is not expected to increase rapidly although it is composed of only one professional staff member. Similarly, with a present staff of three, solid waste management program staffing growth is expected to be sluggish despite the plentitude of new responsibilities and functions prescribed by the Resource Conservation and Recovery Act of 1976 and the Toxic Substances Control Act of 1976.

While staffing of the energy program is regarded as satisfactory, it is felt that elimination of close identification with the Office of Research and Development and alteration of funding from overtarget support to within ceiling line item would considerably enhance status and capabilities.

Because of increasing state and regional responsibilities and dwindling training opportunities, it is imperative that a means be found to provide additional technical assistance to the states and that technical assistance be provided to EPA personnel as well. These training needs are expected to increase over the next five years, and it is hoped that expansion of the current Technical Support Program of EPA's Office of Research and Development will take place.

Generally, no new careers are expected to emerge within the Region VIII EPA office. Engineers will continue to predominate in most of the programs, although the number of technician type personnel may increase as some duties become more routinized. Increased emphasis in the areas of hazardous wastes, resource recovery, toxic substances,

and radiation will require an increasing expertise as new control regulations are promulgated.

Bibliography

Articles and Periodicals

Ardill, John. "Controlling Water From Source to Tap - A New National Strategy," Water and Sewage Works, CXX, No. 1 (January, 1973), p. 56.

Berman, Fred. "Conserving the Future: America's Scrap Processing Industry," Phoenix Quarterly, IV, No. 4 (1973), p. 3.

Billings, Leon G. "The New Water Pollution Control Law," Plant Engineering, XXVII, No. 2 (January 25, 1973), p. 109.

Bragdon, Clifford R. "Municipal Noise Ordinances - 1976," Sound and Vibration (December, 1976), pp. 22-27.

Bureau of National Affairs. Environment Reporter. I-VII. Washington, D.C.: 1977.

Burton, Ian. "The Quality of Environment: A Review," Geographical Review, L, No. 3 (July, 1968), p. 472.

"Chemical Waste Swapping: Promising, but no panacea," Chemical Engineering (July 5, 1976).

Cook, Raymond L. "A New Era in Operation and Maintenance of Wastewater Treatment Plants," Georgia Operator, X, No. 2 (Fall, 1972), p. 12.

Courchaine, C. "A Practical Method for the Sanitarian's Review of Design of Small Public Water-Supply Systems," Ground Water, XI, No. 1 (January-February, 1973), p. 32.

Dajani, Jarir S., et al. "Optimal Designing of Urban Wastewater Collection Networks," Journal of the Sanitary Engineering Division, XCVIII, SA6 (December, 1972), p. 853.

Dean, T. A. "Calculating OSHA Noise Compliance," Pollution Engineering, V, No. 1 (January, 1973), p. 43.

Dryden, S. L. and Judd, S. H. "Think 'Quiet' From Initial Design to Plant Operation," Oil and Gas, MCMLXXI, No. 8 (February 19, 1973), p. 102.

"Electric Power and Clean Air - Can We Have Both?," Tennessee Valley Perspective, III, No. 4 (Summer, 1973), pp. 18-22.

"EPA Annual Report," Pollution Engineering Magazine, VII, No. 12 (December, 1975), pp. 34-65.

Ganotis, Chris G. and Hopper, Richard E. "The Resource Recovery Industry," Environmental Science and Technology, X (May, 1976), p. 425.

Haag, Fred G. "State Noise Restrictions - 1976," Sound and Vibration (December, 1976), p. 27.

Hale, Samuel, Jr. "Solid Waste Management - Closing the Circle," Secondary Raw Materials, X, No. 12 (December, 1972), p. 86.

Hamilton, William S. "Practical Noise Abatement for a General Aviation Airport," Sound and Vibration (February, 1977), pp. 24-27.

Higdon, Ralph E. "Understanding Reverse Osmosis," American City, XII, No. 87 (December, 1972), p. 55.

Hochheiser, Robert M. "How to Control Noise," Plant Engineering, XXVI, No. 20 (October 5, 1972), p. 90.

Hollowell, Craig D. and McLaughlin, Ralph D. "Instrumentation For Air Pollution Monitoring," Environmental Science and Technology, VII, No. 11 (November, 1973), p. 1011.

Kenaga, Eugene E. "Guidelines for Environmental Study of Pesticides: Determination of Bioconcentration Potential," Residue Reviews, XLIV (1972), p. 73.

Khan, A. N. and Siddiqi, R. H. "Treatment of Waste Water By Biological Discs," Indian Journal of Environmental Health, IV, No. 14 (October, 1972), p. 289.

Koczkur, Eugene, et al. "Noise Monitoring and a Sociological Survey of the City of Toronto," Air Pollution Control Association Journal, XXIII, No. 2 (February, 1973), p. 105.

Larsen, Ralph I. "An Air Quality Data Analysis System for Interrelating Effects, Standards, and Needed Source Reductions," Air Pollution Control Agency Journal, XXIII, No. 11 (November, 1973), p. 933.

Levy, Steven J. "Pyrolysis of Municipal Solid Waste," Waste Age (October, 1974).

Lingle, Stephen A. "Paper Recycling in the United States," Waste Age (November, 1974).

Meyers, Sheldon. "EPA and Municipal Resource Recovery," NCRR Bulletin, VI, No. 3 (Summer, 1976).

Miller, E. F. "Desalting as a Source of Water Supply," American Water Works Association Journal, LXIV, No. 12 (December, 1972) p. 804.

Miller, Stanton S. "The Business of Air Pollution Control," Environmental Science and Technology, VII, No. 11 (November, 1973), p. 988.

National Center for Resource Recovery. NCRR Update Monthly. VI, No. 2. Washington, D.C.: February, 1977.

Neal, Lawrence A. and Hervig, Roy A. "Mathematical Water Quality Models," Georgia Operator, X, No. 2 (Fall, 1972), p. 21.

O'Keefe, Andrew E. "The Old, the New, and the Future in Air Pollution Instruments," Clean Air, VII, No. 3 (August, 1973) p. 50.

Parken, Gene F. and Dague, Richard R. "Optimal Design of Wastewater Treatment Systems by Enumeration," Journal of the Sanitary Engineering Division, XCVIII, SA6 (December, 1972), p. 833.

Peterson, Bob. "There's Gold in Your Garbage," Scouting, LXII, No. 7 (October, 1974), pp. 46-48, 84-86.

Ruckelshaus, William D. "Solid Waste Management: An Overview," Public Management (October, 1972).

Rylander, R., et al. "Sonic Boom Effects on Sleep - A Field Experiment on Military and Civilian Populations," Journal of Sound and Vibration, XXIV, No. 1 (1972), p. 41.

"Selected Manufacturers of Equipment to Control Liquid and Solid Hazardous and Toxic Wastes," Pollution Engineering (April, 1976).

Sharpe, Dr. Lois. "What the People Want You to Do with Solid Waste," APWA Reporter, XL, No. 1 (January, 1973), pp. 8-9.

Shippee, Edgar G. "Materials For Noise Absorption," Pollution Engineering, V, No. 1 (January, 1973), p. 37.

Shuster, Kenneth A. "Fuel Conservation in Solid Waste Management," Virginia Town and Country (December, 1974).

Smith, Philip W. "TVA: Making Peace in the Tennessee Valley," The South (May-June, 1976).

Solid Waste Systems. V, No. 5. Los Angeles: Systems Publishing, Inc.. October-November, 1976.

Souci, Gary. "Solid Waste: The New Apocalypse," Audubon, LXXV, No. 1 (January, 1973), p. 114.

Studeny, John. "Waste Paper Recycling: Issues and Answers, Part I," Printing Magazine (December, 1972), p. 50.

Terango, Larry. "The Environmentalists' Concern With Noise-Induced Hearing Loss," Journal of Environmental Health, XXXV, No. 4 (January-February, 1973), p. 350.

Train, Russell E. "The Uses and Abuses of Waste," Compost Science - Journal of Waste Recycling, XVI, No. 3 (May-June, 1975).

"U.S. Finds a Rich Resource: The Nation's Trash Pile," U.S. News & World Report (May 13, 1974), pp. 63-66.

Van Buskirk, R. B. "Can We Get Out of the Pesticide 'Jungle'?," Farm Chemicals and Croplife, CXXXV, No. 12 (December, 1972), p. 42.

Voegtle, John A. and Vilin, Frank J. "A New Concept for Operator Wages," Water Pollution Control Federation Journal, XLV, No. 2 (February, 1973), p. 203.

Walker, Thomas. "Recycling and Solid Waste Management: Economic Compatibility," Secondary Raw Materials, X, No. 12, (December, 1972), p. 88.

Waroff, Deborah. "Recycled Paper," Architectural Design, XLII, No. 11 (1972), p. 673.

Wood, Frank O. "Selecting Softening Process," American Water Works Association Journal, LXIV, No. 12 (December, 1972), p. 820.

Yerges, Lyle F. "Turn the Noise Down," Oil and Gas, LXXI, No. 2 (January 8, 1973), p. 109.

Zaporozec, Alexander. "Groundwater Zoning in Water Resource Management," Water Resources B, VIII, No. 6 (December, 1972), p. 1137.

Books

A Work Force for Environment and Energy, A Master Plan for Environmental/Energy Higher Education in Illinois. Springfield, Illinois: For the Illinois Board of Higher Education, 1975.

Anthrop, Donald F. Noise Pollution. Lexington, Mass.: Lexington Books, 1973.

Astmann, Robert C. (ed.). Rescuing Man's Environment: Nine Essays on Environmental Reform. Princeton, N.J.: Princeton University Council on Environmental Studies, 1972.

Bakish, Robert. Practice of Desalination. Park Ridge, N.J.: Noyes Data Corp., 1973.

Battan, L. J. The Unclean Sky. Science Study Series. New York: Doubleday Anchor, 1966.

Beatty, Rita Gray. The DDT Myth: Triumph of the Amateurs. New York: John Day Co., 1973.

Behan, R. W. and Weddle, Richard M. (eds.). Ecology, Economics, Environment. Missoula, Montana: University of Montana Press, 1971.

Bloodgood, Don E. Sewage Treatment Practice. Chicago: Scranton Publishing Co., Inc.

Bond, Richard G., et al. (eds.). Air Pollution. Cleveland: CRC Press, 1972.

Bond, Richard G. and Straub, Conrad P. (eds.). CRC Handbook of Environmental Control. Cleveland: CRC Press, 1972.

Brodine, Virginia. Air Pollution. New York: Harcourt Brace Jovanovich, 1973.

Brown, Carl, et al. Decision-Making in Water Resource Allocations. Lexington, Mass.: Lexington Books, 1973.

Carson, John Michael, et al. Community Growth and Water Resources Policy. New York: Praeger Publications, 1973.

Council of State Governments. Our Effluent Society. Lexington, Kentucky: February, 1974.

Council of State Governments. The States' Roles in Solid Waste Management - A Task Force Report. Lexington, Kentucky: April, 1973.

Cross, Frank L., Jr. Corporate Communicators' Guide for Environmental Control. Westport, Conn.: Technomic, 1973.

Cross, Frank L., Jr. and Noble, George. Handbook on Hospital Solid Waste Management. Westport, Conn.: Technomic Publications, 1973.

Cross, Frank L., Jr. Handbook on Incineration: Guide to Theory, Design, Operation, and Maintenance. Westport, Conn.: Technomic Publications, 1972.

Detwyler, Thomas R. (ed.). Man's Impact on Environment. New York: McGraw-Hill, 1971.

Dickey, John W., et al. Technology Assessment: Its Applications to the Solid Waste Management Programs of Urban Government. Lexington, Mass.: Lexington Books, 1973.

Dolgin, Erica L. and Guilbert, Thomas G. P. (eds.). Federal Environmental Law. St. Paul: West Publishing Co., 1974.

Dorfman, Robert. Models For Managing Regional Water Quality. Cambridge, Mass.: Harvard University Press, 1973.

Durrenberger, Robert W. Dictionary of Environmental Sciences. Palo Alto, Calif.: National Press Books, 1973.

Eckenfelder, W. W., Jr., and Cecil, L. K. (eds.). Applications of New Concepts in Physical-Chemical Wastewater Treatment. Elmsford, N.Y.: Pergamon Press, 1972.

Edmunds, Stahrl and Letey, John. Environmental Administration. New York: McGraw-Hill, 1973.

Educational Research Council of America. Challenges of Our Time: Technology: Promises and Problems. Boston: Allyn and Bacon, 1972.

Edwards, C.A. (ed.). Environmental Pollution by Pesticides. New York: Plenum Publications, 1973.

Environmental Information Center. The Environmental Regulations Handbook. New York: Environmental Information Center, 1973.

Fahy, Elmore R. Guide to the Packaging of Hazardous Materials and the Legal Requirements of the Regulatory System. New York: McGraw-Hill, 1973.

Fegely, Thomas, et al. Recycling: An Interdisciplinary Approach to Environmental Education. Emmaus, Pa.: Rodale, 1973.

Golueke, C. G. Composting: A Study of the Processes and Its Principles. Emmaus, Pa.: Rodale, Press, 1973.

Goodman, Charles R., et al. (eds.). Environmental Quality and Water Development. San Francisco: W. H. Freeman, 1973.

Graham, Frank, Jr. Since Silent Spring. Greenwich, Conn.: Fawcett Publications, Inc., 1970.

Gunter, John D. and Jameson, William Carl. Solid Waste Management: Economics and Operation. Monticello, Ill.: Council of Planning Librarians Exchange Bibliographies, 1973.

Hann, Roy W., Jr. Fundamental Aspects of Water Quality Management. Westport, Conn.: Technomic Publications.

Harrison, James D. Environmental Preferences: Relevant Studies for Urban Planning. Monticello, Ill.: Council of Planning Librarians Exchange Bibliographies, 1973.

Haskell, Elizabeth H. and Price, Victoria S. State Environmental Management: Case Studies of Nine States. New York: Praeger Publications, 1973.

Haveman, Robert H. and Knesse, Allen V. The Economics of Environmental Policy. New York: J. Wiley, 1973.

Hendricks, Charles W., et al. Fresh Water Pollution. New York: MSS Information Corp., 1973.

Hertzendorf, Martin S. Understanding and Controlling Air Pollution. Westport, Conn.: Science Publications, 1972.

Hesketh, Howard E. Understanding and Controlling Air Pollution. Ann Arbor, Mich.: Science Publications, 1972.

Holl, Karl. Water: Examination, Assessment, Conditioning, Chemistry, Bacteriology, Biology. Berlin, N.Y.: De Gruyter, 1972.

Izaak Walton League of America. A Citizen's Guide to Clean Water. Arlington, Va.: June, 1973.

Jukes, Thomas, et al. Effects of DDT on Man and Other Mammals. New York: MSS Information Corp., 1973.

King, Richard L. Airport Noise Pollution: A Bibliography of Its Effects on People and Property. Metuchen, N.J.: Scarecrow Press, 1973.

Klopfer, Peter H. Behavioral Aspects of Ecology. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Lee, Douglas H. K. Environmental Factors in Respiratory Disease. New York: Academic Press, 1972.

Lee, Kaiman (ed.). Bibliography of the Computer in Environmental Design. Boston: Center for Environmental Research, 1972.

Leithe, W. An Analysis of Air Pollutants. Ann Arbor, Mich.: Humphrey Science Publishers, 1970.

Leithe, Wolfgang. The Analysis of Organic Pollutants in Water and Wastewater. Ann Arbor, Mich.: Ann Arbor Scientific Publications, 1973.

Martin, Hubert (ed.). Insecticide and Fungicide Handbook for Crop Protection. Oxford, U.K.: Blackwell Scientific, 1972.

Mitchell, Ralph (ed.). Water Pollution Microbiology. New York: John Wiley and Sons, Inc., 1972.

Morell, Ben. Our Nation's Water Resources: Policies and Politics. New York: Arno Press, 1972.

National Association for Environmental Education. Selected Environmental Education Programs in North American Education. Edited by Arden L. Pratt, 1974.

National Wildlife Federation. Conservation Directory 1977. Edited by Gloria H. Decker. Washington, D.C.: The National Wildlife Federation, 1977.

New York Health Education Service. Manual of Instruction for Sewage Treatment Plant Operators. Albany: New York Health Education Service.

Newell, Frederick Haynes. Water Resources: Present and Future Uses. New York: Arno Press, 1972.

Noll, Kenneth and Duncan, Joseph (eds.). Industrial Air Pollution Control. Ann Arbor, Mich.: Ann Arbor Science Publishers, 1973.

Oliver, Henry. Irrigation and Water Resources Engineering. New York: Crane, Rusak, 1972.

Pazar, C. Air and Gas Cleanup Equipment. 2d ed. Park Ridge, N.J.: Noyes Data Corp., 1972.

Perera, Thomas and Perera, Gretchen. Louder and Louder: The Dangers of Noise Pollution. New York: E. Watts, 1973.

Pettyjohn, Wayne A. Water Quality in a Stressed Environment: Readings in Environmental Hydrology. Minneapolis: Burgess Publications, 1972.

Pursglove, L. A. and Mancy, K. H. Elements of Biological Wastewater Treatment - Overview. Unit 1, Part 1. Ann Arbor, Mich.: University of Michigan School of Public Health, 1968.

Ranney, David C. Water - Quality Management: An Analysis of Institutional Patterns. Madison: University of Wisconsin Press.

Ranney, M. W. Soundproofing Building Materials. Park Ridge, N.J.: Noyes Data Corp., 1970.

Robinson, D. W. The Relationship Between Hearing Loss and Noise Exposure. Teddington, England: National Physical Laboratory, 1973.

Rodier, Jean. Chemical and Physiochemical Analysis of Water. New York: J. Wiley, 1973.

Roelofs, Robert T., et al. (eds.). Environment and Society: A Book of Readings on Environmental Policy, Attitudes, and Values. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Russell, Helen R. Earth, the Great Recycler. Nashville, Tenn.: Nelson, 1973.

Schildhaver, Carol. Environmental Information Sources: Engineering and Industrial Applications; A Selected and Annotated Bibliography. New York: Special Libraries Association, 1972.

Scorer, Richard Segar. Pollution in the Air: Problems, Policies and Priorities. London, Boston: Routledge and Kegan Paul, 1973.

Shaw, Bill. Environmental Law, People, Pollution and Land Use. St. Paul: West Publishing Co., 1976.

Shepart, Merle (ed.). Insect Pest Management: Readings. New York: MSS Information Corp., 1973.

Sherman, Anthony C. Land and Trash: Our Wounded Land. West Haven, Conn.: Pendulum Press, 1972.

Sherod, H. Floyd (ed.). Environment Law Review. New York: Clark Boardman, 1972.

Spyer, Geoffrey. Architect and Community: Environmental Design in Urban Society. London: Owen, 1971.

Stephan, David L. and Schaffer, Robert B. Waste Treatment and Renovation Status of Process Development. Part 1. Washington, D.C.: Journal of Water Pollution Control Federation, 1970.

Stern, A. C. Air Pollution. Vol. I, II. New York: Academic Press, 1962.

Stern, A. C. (ed.). Air Pollution: A Comprehensive Treatise. Vol. I, II, III. 2d ed. New York: Academic Press, 1968.

Tennessee Energy Office. Tennessee Energy Handbook. Nashville: Tennessee Energy Office, 1975.

Texas Water Utilities Association. Manual of Wastewater Operations. Austin: Texas Water Utilities Association, 1971.

Thibeau, Charles E. Annual Directory of Environmental Information Sources. Boston: Cahners Books, 1972.

Van Tassel, Alfred J. Our Environment: The Outlook for 1980. Lexington, Mass.: Lexington Books, 1973.

Van Valkenburg, Wade (ed.). Pesticide Formulations. New York: M. Dekker, 1973.

Vivian, V. Eugene. Sourcebook for Environmental Education. St. Louis: Mosby, 1973.

Walsbott, George L. Health Effects of Environmental Pollutants. St. Louis: Mosby, 1973.

Water Pollution Control Federation. Manuals of Practice. Washington, D.C.: Water Pollution Control Federation.

Welch, Bruce L., and Welch, Annemarie S. (eds.). Physiological Effects of Noise. New York: Plenum Press, 1970.

Westberg, Karl, et al. The Chemistry of Smog. New York: MSS Information Corp., 1973.

Williamson, Samuel J. Fundamentals of Air Pollution. Reading, Mass.: Wesley Publishers, 1973.

Wilson, David Gordon. The Treatment and Management of Urban Solid Waste. Westport, Conn.: Technomic Publications, 1972.

Public Documents

Citizen's Advisory Committee on Environmental Quality. Report to the President and to the Council on Environmental Quality. Washington, D.C.: December 31, 1975.

Council on Environmental Quality, Federal Interagency Task Force. A Recommended Air Pollution Index. September, 1976.

Council on Environmental Quality. Integrated Pest Management. November, 1972.

Council on Environmental Quality. Environmental Quality. Second Annual Report. August, 1971.

Council on Environmental Quality. Environmental Quality. Fifth Annual Report. December, 1974.

Council on Environmental Quality. Environmental Quality. Sixth Annual Report. December, 1975.

Council on Environmental Quality. Environmental Quality. Seventh Annual Report. September, 1976.

Council on Environmental Quality. OCS Oil and Gas - An Environmental Assessment. April, 1974.

Council on Environmental Quality and Federal Council for Science and Technology. The Role of Ecology in the Federal Government. Washington, D.C.: December, 1974.

U.S. Department of Agriculture. Farmers' Use of Pesticides in 1971... Quantities. Agricultural Report No. 252, July, 1974.

U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service. The Pesticide Review - 1974. September, 1975.

U.S. Department of Health, Education and Welfare, Office of Environmental Education (Contract to Kirkwood Community College, Cedar Rapids, Iowa). A Curriculum Report - Integrated Pest Management. 1973.

U.S. Department of Health, Education and Welfare. Report of State and Local Radiological Health Programs. July, 1976.

U.S. Department of the Interior, Federal Water Pollution Control Administration, Great Lakes Region. Clean Water for Mid-America. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Department of the Interior, Federal Water Quality Administration. Clean Water Quality for the 1970's. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Department of the Interior, Office of Saline Water Report 779. The Economic Value of Water Quality. Washington, D.C.: U.S. Government Printing Office, January, 1972.

U.S. Department of Labor. "Employment in Nuclear Energy Activities." NEWS. June 28, 1976.

U.S. Department of Labor, Bureau of Labor Statistics. Impact of Federal Pollution Control and Abatement Expenditures on Manpower Requirements. Bulletin No. 1836, 1975.

U.S. Environmental Protection Agency, Office of Water Program Operations. A Classification System for Water and Wastewater Facilities and Personnel, Part 3 - Existing Examination Systems: A Current Status Report, prepared by the Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities. April, 1976.

U.S. Environmental Protection Agency, Office of Public Affairs. A Drop to Drink - A Report on the Quality of our Drinking Water. June, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. A Nationwide Survey of Resource Recovery Activities, by Richard E. Hopper. A Current Report on Solid Waste Management Series Publication No. 142, March, 1975.

U.S. Environmental Protection Agency, Division of Manpower Training. A Two-Year Water Quality Monitoring Curriculum, prepared by Ulster County Community College, Stone Ridge, New York. September, 1975.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. Abatement and Pollution Control Training and Educational Programs Presented by the U.S. EPA - July 1973 - June 1975. 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. About Sound. Washington, D.C.: May, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. An Accounting System for Solid Waste Shredders. A Current Report on Solid Waste Management, Series Publication No. 154, May, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. An Overview of Pesticide Applicator Certification. February, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Anaerobic Digestion of Solid Waste and Sewage Sludge to Methane. A Current Report on Solid Waste Management, Series Publication No. 159, July, 1975.

U.S. Environmental Protection Agency. Area and Agency Designation Handbook for Section 208 Area-wide Waste Treatment Management Planning. December, 1974

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Basic Issues on Solid Waste Management Affecting County Government, prepared by National Association of Counties. May, 1973.

U.S. Environmental Protection Agency. Beneficial Use of Storm Water. Washington, D.C.: U.S. Government Printing Office, January, 1973.

U.S. Environmental Protection Agency, Office of Public Affairs. Building for Clean Water. August, 1975.

U.S. Environmental Protection Agency. "Certification of Pesticide Applicators." Federal Register. Vol. 39, No. 197, October 9, 1974.

U.S. Environmental Protection Agency, Office of Legislation, Public Inquiries Branch. The Challenge of the Environment: A Primer on EPA's Statutory Authority. Washington, D.C.: December, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Clean Air and Your Car. March, 1974.

U.S. Environmental Protection Agency, Office of Public Affairs. Clean Air the Breath of Life. April, 1976.

U.S. Environmental Protection Agency, Mobile Source Pollution Control Office. Control Strategies for In-Use Vehicles. Washington, D.C.: December, 1972.

U.S. Environmental Protection Agency, Water Planning Division. Cost Analysis Handbook for Section 208 Areawide Waste Treatment Management Planning Federal Assistance Applications. May, 1975.

U.S. Environmental Protection Agency. DDT - A Review of Scientific and Economic Aspects of the Decision to Ban its Use as a Pesticide. July, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Mangement Programs. Decision-Makers Guide in Solid Waste Management. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Environmental Protection Agency, Office of Pesticide Programs. Digest of State Pesticide Use and Application Laws. 1977.

U.S. Environmental Protection Agency. "Effective Hazardous Waste Management (Non-radioactive) Position Statement." Federal Register. Vol. 41, No. 161, August 18, 1976.

U.S. Environmental Protection Agency, Resource Recovery Division. Energy Conservation through Improved Solid Waste Mangement, by Robert A. Lowe. Solid Waste Management Series Publication No. 125, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Energy Recovery from Waste. Solid Waste Management Series Publication No. 36d.ii, 1973.

U.S. Environmental Protection Agency. "EPA Amends Funding Formula for Areawide Planning Grants." Environmental News. October 14, 1976.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. EPA Noise Control Program - Progress to Date. May, 1976.

U.S. Environmental Protection Agency. "EPA Seeking Greater Public Involvement in Water Quality Management Programs." Environmental News. October 22, 1976.

U.S. Environmental Protection Agency. "Environmental Radiation Protection Standards for Nuclear Power Operations." Federal Register. Vol. 42, No. 9, January 13, 1977.

U.S. Environmental Protection Agency, Office of Radiation Programs, Joint Study of the Atomic Energy Commission and the Department of Health, Education and Welfare. Estimates of Ionizing Radiation Doses in the United States, 1960 - 2000. Rockville, Md.: August, 1972.

U.S. Environmental Protection Agency, Region IV, Office of Water Programs, Water Supply Branch. Evaluation of the Florida Water Supply Program. Atlanta: 1973.

U.S. Environmental Protection Agency, Office of Public Affairs. Everybody's Business - The Resource Conservation and Recovery Act of 1976. February, 1977.

U.S. Environmental Protection Agency, Office of Pesticide Programs, Office of Water and Hazardous Materials. Farmer's Pesticide Use Decisions and Attitudes on Alternate Crop Protection Method. 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Financing Solid Waste Management in Small Communities, by Eric R. Zausner. 1971.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. First Report to Congress: Resource Recovery and Source Reduction. 1974.

U.S. Environmental Protection Agency, Office of Public Affairs. First Things First. September, 1974.

U.S. Environmental Protection Agency, Office of Research and Monitoring. Full Scale Parallel Activated Sludge Process Evaluation. Washington, D.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Goals of the Federal Solid Waste Management Program, by Sheldon Meyers. 1976.

U.S. Environmental Protection Agency. "Grants to State and Designated Areawide Planning Agencies - Conditions, Policies and Procedures." Federal Register. Vol. 40, No. 229, November 28, 1975.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guide for Compiling a Comprehensive Emission Inventory. Research Triangle Park, N.C.: January, 1972.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guide to Research in Air Pollution. Research Triangle Park, N.C.: 1972.

U.S. Environmental Protection Agency. Guidelines for Areawide Waste Treatment Management Planning. August, 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Guidelines for Developing a Training Program in Noise Survey Techniques. July, 1975.

U.S. Environmental Protection Agency, Office of Water and Hazardous Materials. Guidelines for Preparation of Water Quality Management Plans. September, 1974.

U.S. Environmental Protection Agency, Office of Water Programs Operations. Guidance for Preparing a Facility Plan. May, 1975.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guidelines for Technical Services of a State Air Pollution Agency. Research Triangle Park, N.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. Guidelines to Career Development for Wastewater Treatment Plant Personnel. September, 1973.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Hazardous Wastes. Solid Waste Management Series Publication No. 138, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Hazardous Wastes and their Management. Environmental Information Series, May, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Health Effects of Air Pollutants. June, 1976.

U.S. Environmental Protection Agency. "Home Study Course on Wastewater Collection Systems." Environmental News. August 26, 1976.

U.S. Environmental Protection Agency, Office of Air and Water Programs. Improving Water Quality Management in Nonmetropolitan Areas. Washington, D.C.: January, 1973.

U.S. Environmental Protection Agency. Incentives for Recycling and Reuse of Plastics - A Summary Report. Solid Waste Management Series Publication No. 41c.1, 1973.

U.S. Environmental Protection Agency, Office of Pesticide Programs, Office of Water and Hazardous Materials. Incremental Cost Impacts of the 1972 Federal Insecticide, Fungicide and Rodenticide Act as Amended. January, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Intergovernmental Approaches to Solid Waste Management, by Richard O. Toftner and Robert M. Clark. 1971.

U.S. Environmental Protection Agency, Office of Air and Water Programs. Inventory of Interstate Carrier Water Supply Systems. Washington, D.C.: July, 1972.

U.S. Environmental Protection Agency, Water Planning Division. Interior Output Evaluation Handbook for Section 208 Areawide Waste Treatment Management Planning. June, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Mangement Programs. Land Availability, Crop Production and Fertilizer Requirements in the United States. A Current Report on Solid Waste Management, October, 1975.

U.S. Environmental Protection Agency. Management Agencies Handbook for Section 208 Areawide Waste Treatment Management. September, 1975.

U.S. Environmental Protection Agency. Management of Nonpoint Sources and District Action, by Eckhardt C. Beck. February 3, 1976.

U.S. Environmental Protection Agency. Manpower and Training Needs for Air Pollution Control. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Environmental Protection Agency, Office of Water Program Operations, Manpower Development Staff. Manpower Requirements for Wastewater Collection Systems in Cities and Towns up to 150,000 in Population. June, 1973.

U.S. Environmental Protection Agency. Markets and Technology for Recovering Energy from Solid Waste, by Steven J. Levey. Solid Waste Management Series Publication No. 130, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Market Locations for Recovered Materials. A Current Report on Solid Waste Management Series Publication No. 518, August, 1976.

U.S. Environmental Protection Agency. "Materials Recovery - Solid Waste Management Guidelines for Source Separation." Federal Register. Vol. 40, No. 181, September 17, 1975.

U.S. Environmental Protection Agency and National Institute of Municipal Law Officers. Model Community Noise Control Ordinance. September, 1975.

U.S. Environmental Protection Agency. "National Interim Primary Drinking Water Regulations." Federal Register. Vol. 40, No. 248, December 24, 1975.

U.S. Environmental Protection Agency. No Small Task: Establishing National Effluent Limitations Guidelines and Standards. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Around our House. February, 1977.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Control Programs of the Federal Government. July, 1976.

U.S. Environmental Protection Agency, Office of Noise Control and Abatement. Noise Facts Digest. Washington, D.C.: June, 1972.

U.S. Environmental Protection Agency. Noise from Heavy Construction. August, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Pollution. September, 1974.

U.S. Environmental Protection Agency. Noise Programs of Professional/Industrial Organizations, Universities and Colleges. EPA Report NTID300.9. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Environmental Protection Agency. O & M - Making Wastewater Treatment Work in Your Community. May, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Passenger Noise Environments of Enclosed Transportation Systems. June, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Pesticide Registration: How It Protects You, Your Family and the Environment. February, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Portable Air Compressor Noise Emission Standards. 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Proceedings 1975 Conference on Waste Reduction. April, 1975.

U.S. Environmental Protection Agency. Progress in the Prevention and Control of Air Pollution in 1974 - Report to Congress. 1975.

U.S. Environmental Protection Agency, Office of Radiation Programs. Radiological Quality of the Environment. May, 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Railroad Noise Emission Standard. 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Recovering Resources from Solid Waste Using Wet-Processing, by David G. Arella. Solid Waste Management Series Publication No. 47d, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Recycling and the Consumer. Solid Waste Management Series Publication No. 117, 1974.

U.S. Environmental Protection Agency, Region I. Regional Administrator's Annual Report - Environmental Quality in New England. Boston: August, 1975.

U.S. Environmental Protection Agency. Relationship Between Animal Wastes and Water Quality. Washington, D.C.: EPA Publications Branch, June, 1972.

U.S. Environmental Protection Agency. "Residential, Commercial and Institutional Solid Wastes - Proposed Guidelines for Storage and Collection." Federal Register. Vol. 40, No. 134, July 11, 1975.

U.S. Environmental Protection Agency. Residential Paper Recovery: A Municipal Implementation Guide, by Penelope Hansen. 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery and Land Protection: An Environmental Imperative, by Arsen J. Darnay, Jr. 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery Plant Implementation: Guides for Municipal Officials - Financing, by Robert E. Randol. Solid Waste Management Series Publication No. 157.4, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery Plant Implementation: Guides for Municipal Officials - Further Assistance, by Denise Hawkins. Solid Waste Management Series Publication No. 157.8, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. San Diego County Demonstrates Pyrolosis of Solid Waste, by Steven J. Levy. Solid Waste Management Series Publication No. 80d.2, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Separating Paper at the Waste Source for Recycling, by Stephen Lingle. Solid Waste Management Series Publication No. 128, 1974.

U.S. Environmental Protection Agency. The Social Impact of Noise. EPA Report NTID300.11. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Environmental Protection Agency, Office of Public Affairs, Public Inquiries Branch. Solid Waste Management: A List of Available Literature. Washington, D.C.: January, 1972.

U.S. Environmental Protection Agency. Solid Waste Management: Abstracts from the Literature, 1968. EPA Report SW-66.4c. Washington, D.C.: U.S. Government Printing Office, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Solid Waste Management: Available Information Materials. Washington, D.C.: November, 1975.

U.S. Environmental Protection Agency. "Solid Waste Management - Guidelines for Beverage Containers." Federal Register. Vol. 40, No. 220, November 13, 1975.

U.S. Environmental Protection Agency, Office of Pesticide Programs. Standards for Certification of Pesticide Applicators. October, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. State and Municipal Noise Control Activities 1973 - 1974. January, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. State Program Implementation Guide: Hazardous Waste Transportation Control. A Current Report on Solid Waste Management, Series Publication No. 512, March, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. State Solid Waste Management Agencies. March, 1976.

U.S. Environmental Protection Agency. Study of Manpower Needs for Implementation of the Water Pollution Control Act Amendments of 1972 - Report No. 1: Estimate of State Water Pollution Control Agency Manpower Needs. November, 1975.

U.S. Environmental Protection Agency. Study of Manpower Needs for Implementation of the Water Pollution Control Act Amendments of 1972 - Report No. 2. November, 1975.

U.S. Environmental Protection Agency, Library Systems Branch. Summaries of Foreigh Governments Environmental Reports. Washington, D.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Summaries of Solid Waste Intramural Research and Development Projects, by Andrew W. Breidenbach. 1971

U.S. Environmental Protection Agency, Office of Water Programs. Surface Pollution Problems in the United States. Washington, D.C.: May, 1972.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. The Benefit-Cost Relationship in Entry Job Training in Water Distribution. September, 1973.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. The Demonstration of Systems for Recovering Materials and Energy from Solid Waste, by John H. Skinner. 1974.

U.S. Environmental Protection Agency, Office of Research and Monitoring. The Quality of Life Concept - An Anthology from 1972 EPA Symposium. Washington, D.C.: August, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Toward Cleaner Water - The New Permit Program to Control Water Pollution. 1974.

U.S. Environmental Protection Agency, Office of Water Supply. Training Strategy. October 21, 1976.

U.S. Environmental Protection Agency, Office of Research and Development. Who's Who II in the Interagency Energy/Environment R & D Program. October, 1976.

U.S. Environmental Protection Agency. Work Plan Handbook for Section 208 Areawide Waste Treatment Management Planning. February, 1975.

U.S. Environmental Protection Agency. "Worker Protection Standards for Agricultural Pesticides." Federal Register. Vol. 39, No. 92, May 10, 1974.

U.S. Federal Energy Administration. Careers in Energy Industries. 1975.

U.S. Federal Energy Administration. Directory of State Government Energy-Related Agencies. September, 1975.

U.S. Federal Energy Administration, National Energy Information Center. Review and Evaluation: Presidential Task Force on Power Plant Acceleration. August, 1976.

U.S. Federal Energy Administration. Project Independence Blueprint Final Task Force Report: Labor Report. Washington, D.C.: November, 1974.

U.S. Federal Energy Administration, Presidential Task Force on Power Plant Acceleration. Status Significant U.S. Power Plants In Planning or Under Construction. July 1, 1976.

U.S. Federal Power Commission. Federal Power Commission 1975 Annual Report. 1975.

U.S. Federal Power Commission. The Federal Power Commission: What it is and What it Does. Washington, D.C.: 1977.

U.S. Nuclear Regulatory Commission. Construction Status Report - Nuclear Power Plants - Data for Decisions. December, 1976.

U.S. Nuclear Regulatory Commission. Operating Units Status Report - Licensed Operating Reactors - Data for Decisions. March, 1976.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Air Pollution Control Program - 1975 Annual Report. July, 1976.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Pesticide Control Program. January, 1977.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Report on Water Quality, Virgin Islands, U.S. of A. 1970 - 1975. June, 1975.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs. Virgin Islands Territorial Plan for Certification of Commercial and Private Applicators of Restricted Use Pesticides. Febraury, 1976.

U.S. Virgin Islands, Department of Health, Division of Environmental Health. Air Quality Control Implementation Plan for the U.S. Virgin Islands. 1972.

Reports

Alabama Department of Public Health, Environmental Health Administration, Division of Public Water Supplies. Evaluation of the Semi Public Water Supplies in Alabama. Montgomery: Alabama Water Improvement Commission, 1975.

Alabama Water Improvement Commission. 1973-1974 Biennial Report. 1974.

American Chemical Society. Solid Wastes - An Environmental Science and Technology Reprint Book. Washington, D.C.: American Chemical Society, 1971.

American Iron and Steel Institute. Summary Report of Solid Waste Processing Facilities. Washington, D.C.

American Public Health Association. Public Exposure to Ionizing Radiations. New York: American Public Health Association, 1958.

American Society of Civil Engineers. Ground Water Management. New York: American Society of Civil Engineers, 1972.

American Society for Testing and Materials. Biological Methods For the Assessment of Water Quality. Symposium Proceedings. Philadelphia: American Society for Testing and Materials, 1973.

Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities. Roles and Responsibilities for Developing a Comprehensive State Water and Wastewater Operator Training Program. Prepared for the U.S. Environmental Protection Agency, Office of Water Program Operations. July, 1976.

Atlanta Regional Commission. Chattahoochee Corridor Study. Atlanta: July, 1976.

Atlanta Regional Commission. Possibilities for Water Conservation in the Atlanta Region. Atlanta: March, 1976.

Baker, Robert A. Taste and Odor in Water: A Critical Review. Manufacturing Chemists Association Report F-A233. May, 1967.

Blair, Louis H. and Schwartz, Alfred I. How Clean is Our City? A Guide for Measuring the Effectiveness of Solid Waste Collection Activities. Washington, D.C.: Urban Institute, 1972.

Bloom, Sandra C. and Degler, Stanley E. Pesticides and Pollution. Washington, D.C.: Bureau of National Affairs, 1969.

Boyd, Eldon M. Protein Deficiency and Pesticide Toxicity. Springfield. Ill.: Thomas, 1972.

Burke, Jacqueline M. and Fisher, Westin A. The Realities of Recycling. Minneapolis: Minnesota Pollution Control Agency, 1973.

Committee on Boundary Noise. The Regulation of Steady-State Noise Sources at Boundaries in Municipalities of North Carolina. North Carolina: September, 1973.

Committee of Tin Mill Products Producers, American Iron and Steel Institute. Progress Report on Recycling. Washington, D.C.

Committee of Tin Mill Products Producers, American Iron and Steel Institute. Restrictive Container Legislation. Washington, D.C.: March, 1976.

Cornell, Howland, Hayes, Merryfield, Clair A. Hill and Associates. Wastewater Treatment Plant Staffing Guidelines. Prepared for U.S. Environmental Protection Agency. October, 1972.

Coughlin, R. W. Air Pollution and Its Control. New York: American Institute of Chemical Engineers, 1972.

Dasmann, Raymond F., et al. Ecological Principals for Economic Development. Prepared for the International Union for Conservation of Nature and Natural Resources, and the Conservation Foundation. New York: J. Wiley, 1973.

Degler, Stanley E. and Bloom, Sandra C. (eds.). Federal Pollution Control Programs: Water, Air, and Solid Wastes. Washington, D.C.: Bureau of National Affairs, 1969.

Frost, and Sullivan, Inc. The Solid Waste Control Market. Report 141. May, 1972.

Gendel, Eugene B., et al. Manpower Analysis: Municipal Wastewater Treatment Facilities in New England. Prepared for U.S. Environmental Protection Agency. October, 1972.

Georgia State Board of Examiners for Certification of Water and Wastewater Treatment Plant Operators. Water and Wastewater Operator Certification in Georgia - Progress Report, July 1, 1975 - June 30, 1976. Atlanta, 1976.

Goldstein, E., et al. Air Pollution and Methods of Control. New York: MSS Information Corp., 1973.

Gould, Robert F. (ed.). Organic Pesticides in the Environment. Washington, D.C.: American Chemical Society, 1966.

Groman, William A. Forest Fertilization. Prepared for U.S. Environmental Protection Agency. Washington, D.C.: August, 1972

League of Women Voters Education Fund. Municipal Sludge: What Shall We Do With It? Current Focus Series Publication No. 627. 1976.

League of Women Voters Education Fund. Recycle - In Search of New Policies for Resource Recovery. Publication No. 132. Washington, D.C.: 1972.

League of Women Voters Education Fund. Solid Waste - It Won't Go Away. Current Focus Series Publication No. 675. April, 1971.

League of Women Voters Education Fund. Solid Waste Management: The National Issues. Community Guide Series Publication No. 134. 1972.

League of Women Voters of the United States. Study of Solid Waste Management. Community Guide Series Publication No. 699. November, 1971.

Lee, Lester. Smog: A Report to the People. Pasadena: California Institute of Technology, 1972.

Mackinney, H. W. Disposal of Plastics With Minimum Environmental Impact. American Society For Testing and Materials Special Publication 533. Philadelphia: 1973.

McClellan Air Force Base. Interim Report on Pilot Programs for Pesticide Monitoring of Water on Air Force Bases. National Technical Information Service Report AD-751 894. December, 1969.

Moreau, David H., et al. Regional Water Resource Planning For Urban Needs. Raleigh: Water Resources Research Institute of the University of North Carolina, 1973.

National Academy of Sciences. Report on Motor Vehicle Emissions to the EPA. Washington, D.C.: National Academy of Sciences, 1973.

National Association for Environmental Education. Current Issues in Environmental Education-1975: Selected Papers From the Fourth Annual Conference of the National Association for Environmental Education. Edited by Robert Marlett. Columbus: The ERIC Center for Science, Mathematics and Environmental Education, 1975.

National Association for Environmental Education. Current Issues in Environmental Education - II: Selected Papers from the Fifth Annual Conference of the National Association for Environmental Education. Edited by Robert Marlett. Columbus: The ERIC Center for Science, Mathematics and Environmental Education, 1976.

National Center for Resource Recovery. Putting Solid Waste and Resource Recovery in Perspective. Washington, D.C.: 1976.

National Field Research Center, Inc. An Environmental Manpower Projection Study. 7 Volumes. Prepared for U.S. Environmental Protection Agency and the Illinois Board of Higher Education. Iowa City, Iowa: 1975.

National Field Research Center, Inc. State of Illinois, Environmental/Energy Education in the Pubic Community College System. Prepared for U.S. Environmental Protection Agency and the Illinois Board of Higher Education. Iowa City, Iowa: 1975.

National Planning Association. The Demand for Scientific and Technical Manpower in Selected Energy-Related Industries, 1970-1985: A Methodology Applied to a Selected Scenario of Energy Output. A Summary.

North Carolina Agricultural Extension Service. North Carolina Pesticide Training Manual. September, 1973.

North Carolina Water Resources Research Institute. The Effects of Sewer Surcharges on the Level of Industrial Wastes and the Use of Water By Industry. National Technical Information Report PB-213 267/8. August, 1972.

Olympus Research Corporation. Manpower Planning for Wastewater Treatment Plants. Prepared for the U.S. Environmental Protection Agency, Office of Water Programs.

Patterson, W. L. and Banker, R. F. Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities. Prepared for the U.S. Environmental Protection Agency, Office of Research and Monitoring. October, 1971.

South Carolina Department of Education. Environmental Education: A Source Book for Educators. Columbia: South Carolina Department of Education, 1976.

Southwest Georgia Planning and Development Commission. Energy Management and Conservation in the 14-County Southwest Georgia APDC. Camilla: January, 1976.

Spindletop Research, Inc. Economic Situation Issues Description: Coal Mining. Prepared for the Kentucky Development Cabinet. June, 1974.

Spindletop Research, Inc. Kentucky's Coal Manpower: An Updated Assessment of Needs and Availability for Increased Production through 1985. Prepared for the Kentucky Development Cabinet. December, 1974.

Stern, Carlos, et al. Impacts of Beverage Container Legislation on Connecticut and a Review of the Experience in Oregon, Vermont and Washington State. Report to the Connecticut State Legislature, Department of Environmental Protection, by members of the University of Connecticut Department of Agricultural Economics. March 12, 1975.

Tennessee Valley Authority. 76 Annual Power Report. Knoxville: Tennessee Valley Authority, 1976.

Tennessee Valley Authority. TVA 75 Annual Report. Knoxville: Tennessee Valley Authority, 1975.

Virginia Polytechnic Institute and State University. Improving Water Quality by Removal of Pesticide Pollutants with Aquatic Plants. National Technical Information Service Report PB-495/6. August, 1972.

Young, Dennis. How Shall We Collect the Garbage? A Study in Economic Organization. Washington, D.C.: Urban Institute, 1972.

Zinger, Clem L., et al. Environmental Volunteers in America: Findings and Recommendations of the Steering Committee of the National Center For Voluntary Action (NCVA) Environmental Project. Washington, D.C.: National Center For Voluntary Action, 1973.

Unpublished Material

Agee, James L. Remarks before the Association of American Pesticide Control Officials, Inc. Washington, D.C.: April 7, 1975.

American Chemical Society. Photochemical Smog and Ozone Reactions. Conference Proceedings. Washington D.C.: American Chemical Society, 1972.

Baylay, Dr. Ned T. Management Decisions Regarding Farm Chemicals. Paper presented at 1971 National Agricultural Outlook Conference. Washington, D.C.: U.S. Department of Agriculture, 1971.

Cairns, John, Jr. and Dickson, K. L. (eds.). Biological Methods for the Assessment of Water Quality. Symposium proceedings of the American Society for Testing and Materials. Philadelphia: American Society for Testing and Materials, 1973.

Sopper, William E. and Kardos, Louis T. (eds.). Recycling Treated Municipal Wastewater and Sludge Through Forest and Cropland. Symposium proceedings, Pennsylvania State University. University Park: Pennsylvania State University, 1973.